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Except Mental or Infectious Diseases

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and other complaints which need rest, skilled observation, chemical, bacteriological and protozoological investigation, and dietetic, physical, or other special treatment, or daily supervision. The Castle is fitted with Laboratories, X-ray Department, Electrocardiograph, Medical Baths, and Lifts.

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SPECIAL FEE FOR INVESTIGATION ONLY, 30 GUINEAS,
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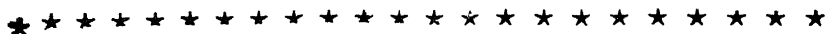
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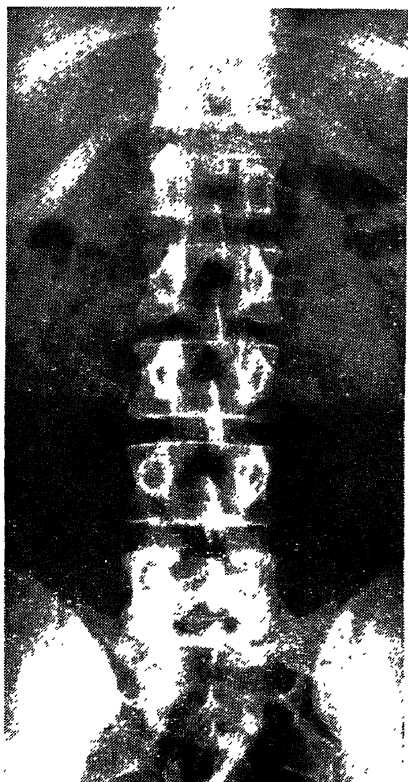
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Lateral kVp 85. mA.80 Exposure time $4\frac{1}{2}$ seconds. Focal-film distance 48 inches

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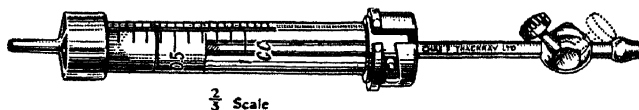
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SYRINGE
FOR TRANSFUSIONS
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Vide BRITISH MEDICAL JOURNAL OF DEC. 11th, 1943
 Vol. ii, p. 749

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Regd. design 840962

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One size only, 1c.c.15/6 each.

For detailed description see Editor's notes, page 382

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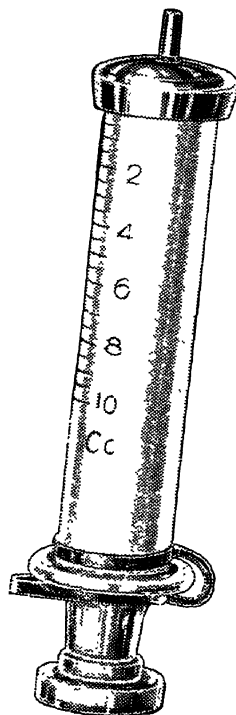
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HYPODERMIC
SYRINGES

Regd.
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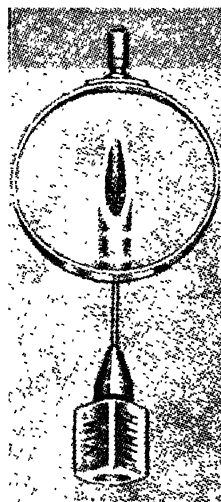
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Sizes 1 c.c. to 20 c.c. Prices on application.



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SULPHANILAMIDE TULLE (OPTREX BRAND) In the first place this dressing shields the lesions from external interference whilst allowing free drainage through its wide gauze mesh. It is impervious to organisms and adheres readily without pulling.

In the second place **SULPHANILAMIDE TULLE** is impregnated with an emulsion containing 10% sulphanilamide. It is thus bacteriostatic and helps to prevent the complications of infection.

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Each Inhaler contains β -aminopropylbenzene (amphetamine) 0.325 gm., oil of lavender 0.097 gm., and menthol 0.032 gm.

**An effective
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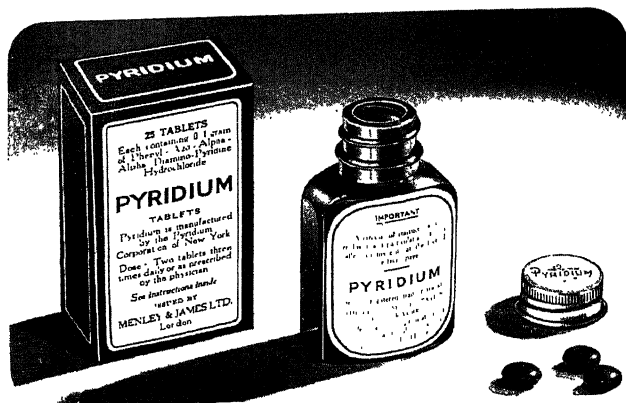
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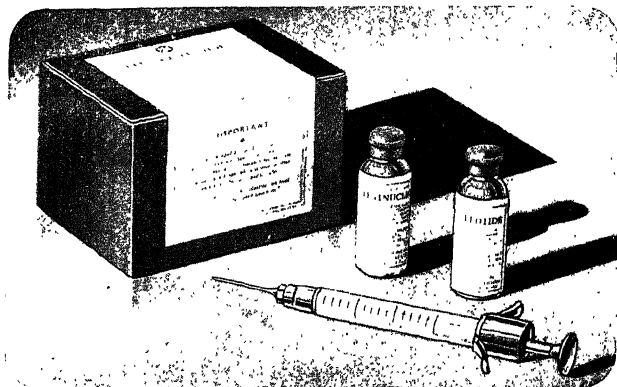
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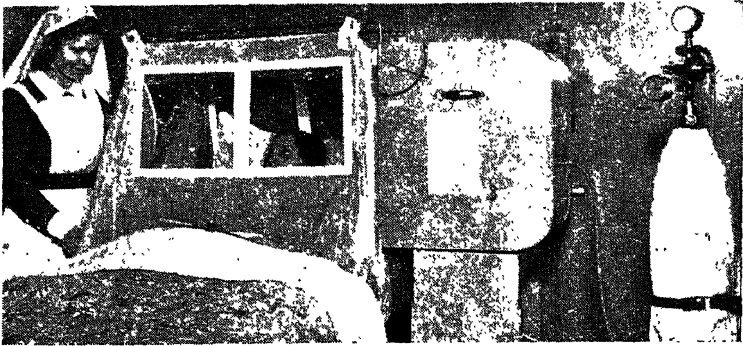
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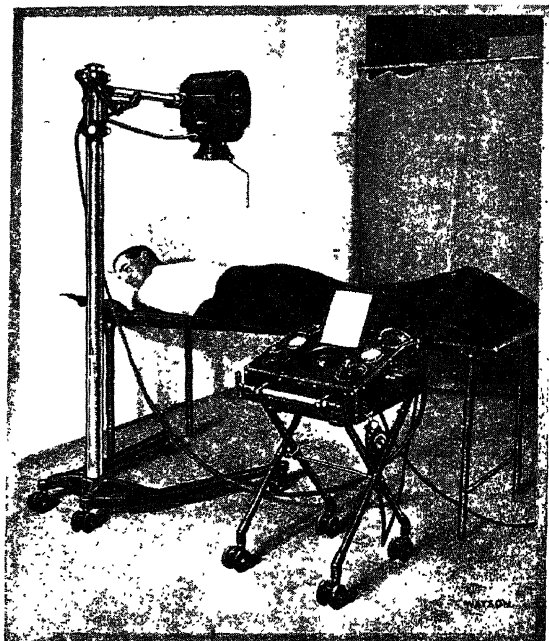
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References. (1) Medical Annual, 1943, page 63. (2) Essentials of Modern Surgery, Handfield Jones, 2nd Edition, 1943. (3) Lister Memorial Lecture, 1939; British Medical Journal, April 15, 1939, page 762.

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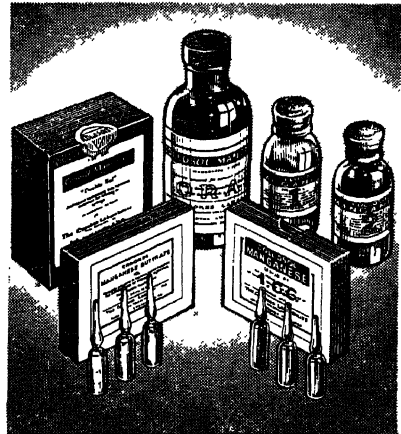
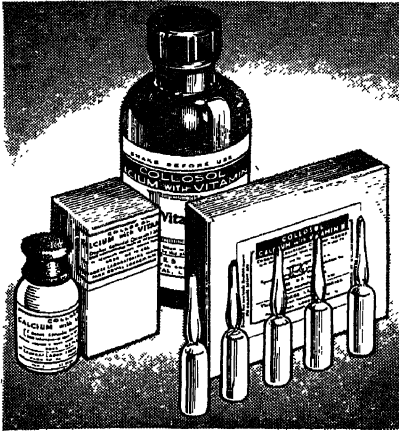
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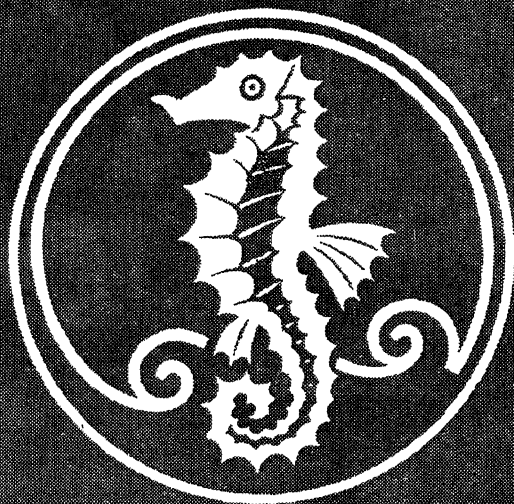
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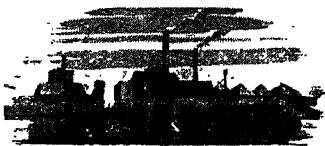
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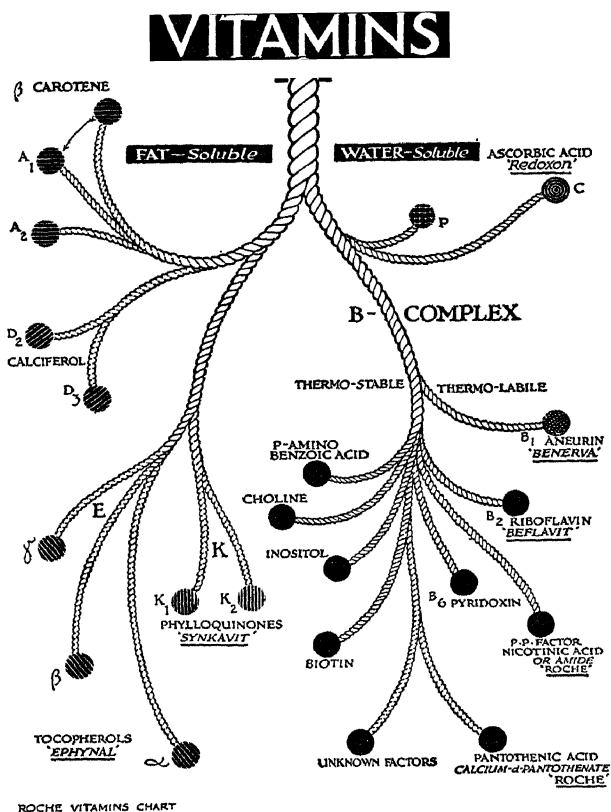
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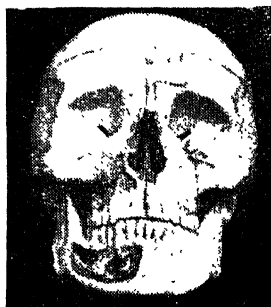
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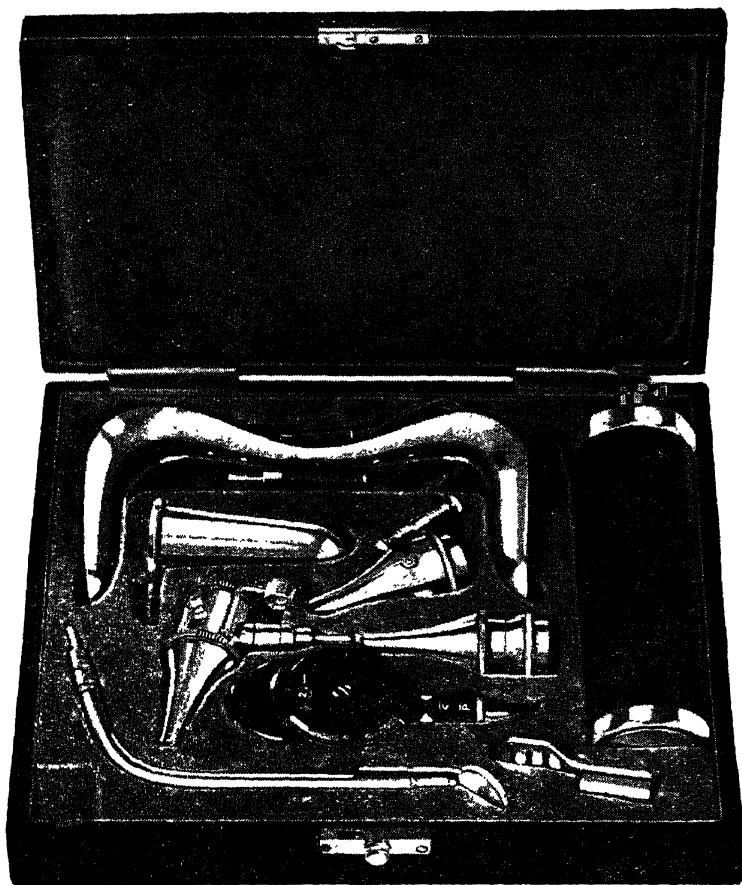
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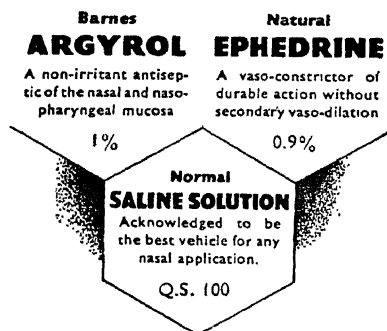
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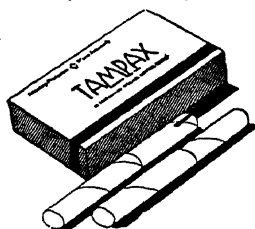
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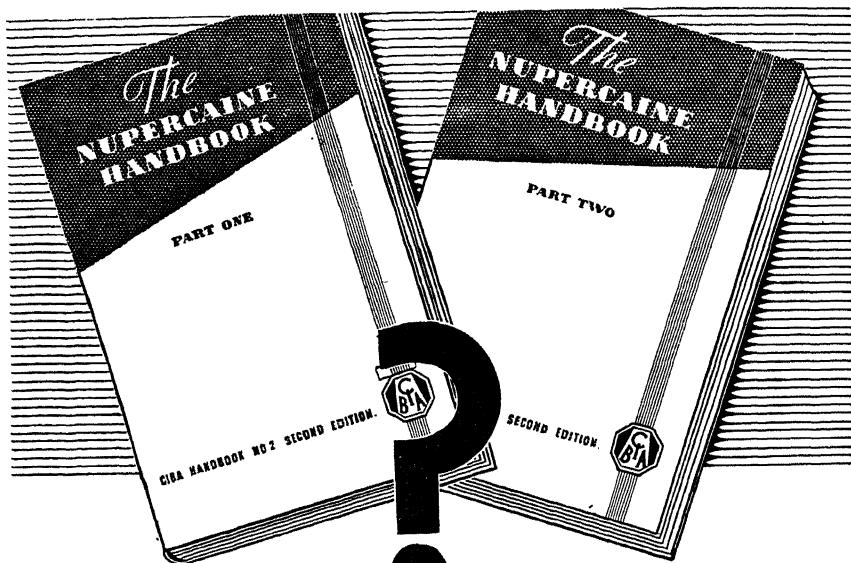
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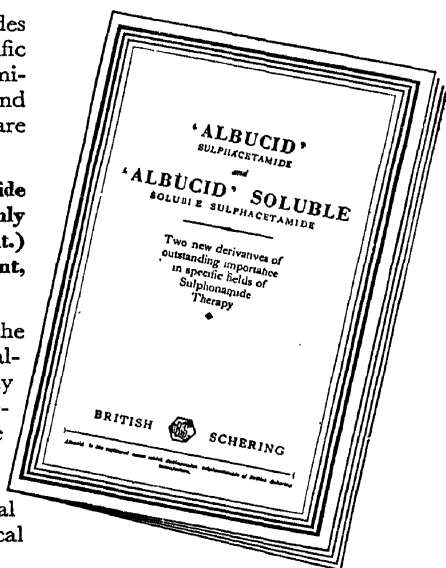
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THE fact that each issue of the MEDICAL ANNUAL published during the war was out of print very shortly after publication, affords striking evidence of the outstanding value to the Profession of this annual review of medical and surgical progress.

The Publishers would like to express their regret to those would-be purchasers who have been disappointed in being unable to secure their usual copy.

In view of severe paper rationing the edition is controlled very much by the numbers ordered in advance, with a small margin for late applicants. Advance orders have already exceeded those for the last volume, but owing to some concession on the part of the Ministry of Supply, it has been possible to print a larger edition, which it is hoped will be sufficient to meet all demands.

To the Editors and Contributors the Publishers again wish to express on behalf of readers the world over a very real sense of indebtedness for their invaluable co-operation in the production of this volume.

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THE MEDICAL ANNUAL 1944

INTRODUCTION

BY THE EDITORS

MEDICINE

INFECTIVE JAUNDICE.—The condition formerly known as catarrhal jaundice has long been a nuisance in schools, where it has been a major cause of absence. From time to time some special incident has attracted attention. In the last war there were a large number of cases, but attention was mainly directed to Weil's disease, in which the spirochæte had recently been discovered. Between the wars a few epidemics were recognized, and some were fully investigated, always with negative results. The dramatic circumstances of the epidemics of the last few years have led to great activity in research, and some important advances have been made. The long incubation period has been established, ignorance of which greatly hampered field work in the past. It is now generally agreed that the condition is hepatitis. The histological changes are common to numerous types with very different epidemiology, but quite distinct from the changes found in yellow fever. But in spite of all research the causal factor still eludes discovery. The subject is fully surveyed in a special article on Infective Hepatitis. We particularly welcome the author as a contributor, as the article comes from Col. William S. Middleton, Consulting Physician to the United States Army in the European Theatre of Operations.

THE BRITISH PHARMACOPŒIA, 1932: 6TH ADDENDUM.—Few practitioners buy the *British Pharmacopœia* nowadays, and the elaborate monographs designed to ensure that drugs are properly prepared interest few except wholesale manufacturers and the chemists. Hence medical practitioners in general are unaware of the great revolution which has been taking place even since the publication of the last edition in 1932. The Galenicals are being defeated and are fading away, while their young rivals the synthetic preparations stride from strength to strength and oust them from the pages. The Galenicals have put up a great fight, aided by the fact that many synthetic drugs of the highest value are proprietary preparations and difficulties are involved in their admission to the august official recognition of the *Pharmacopœia*. The struggle is largely over. Perhaps some day a firm of manufacturers will erect a laboratory devoted, one trusts, solely to research on the ground so long worthily occupied by the Chelsea Physic Garden.

POLIOMYELITIS.—The theory that poliomyelitis is an alimentary infection is gaining ground although it was greeted with some scepticism when it was first propounded. The presence of the virus in stools of carriers and of cases is now definitely established. Evidence is now adduced that sewage may be infective several months after an epidemic has subsided in an area. The virus has occasionally been discovered in drinking water, but there are difficulties in accepting this path as the usual mode of the spread of epidemics.

IMMUNIZATION AGAINST DIPHTHERIA.—The great efforts which have been made in recent years by the medical profession to persuade mothers to have their children immunized against diphtheria are beginning to have effect. Investigations show that there may be a wide difference between the percentage of children immunized in neighbouring areas, and it is evident that persistent propaganda is called for in many directions. A keen general practitioner finds little difficulty in persuading mothers to have their children immunized, but it is necessary to have a keen profession as well as keen individual practitioners. The experiences of New York and of Toronto prove that it is the duty of the medical profession to aim at the elimination of this needless waste of children's lives.

EPIDEMIC NAUSEA AND VOMITING.—There must exist whole battalions of nameless minor epidemics with negligible mortality which drift about the country causing little more than passing interest. Their duration is usually short and they leave no appreciable disability, and in general they are only a temporary nuisance in a school or institution. Their most serious results are the errors of diagnosis which are not uncommonly made. An instance of this is the frequency with which tuberculosis is diagnosed in Bornholm disease. Yet even the most innocent of these epidemics may here and there produce a serious result. It is only occasionally that some practitioner recognizes that he is dealing with a clinical entity. Glandular fever or infectious mononucleosis is a good example of such an epidemic. Practically unrecognized 25 years ago, it is now an every-day diagnosis and careful observation has established the existence of a type of considerable severity. Dr. Pickles, who has paid special attention to minor epidemics in practice, contributes a special review of what is an undoubted entity under the title of Epidemic Nausea and Vomiting. The first outbreak in this country was recorded by Drs. Reginald Miller and Martin Raven as late as 1936. Only a few outbreaks have been recorded subsequently. Nevertheless it is undoubtedly far from rare, and as Dr. Gray has pointed out, recognition of the syndrome will save endless trouble and lengthy and useless investigations in the belief that an epidemic is due to food poisoning. The article is recommended to all practitioners.

FLUOROSIS.—The effect of fluorosis has only come under investigation in recent years. It first attracted attention from gross manifestations in workers exposed to its action in industries. Recently attention has

been paid to the result of consuming waters containing fluorine. It is found to produce mottling of the dental enamel, characterized by the presence of white opaque spots formed during calcification of the teeth. There is some evidence, not yet fully confirmed, that the concentration of fluorine in the water corresponds with the distribution of endemic goitre. Numerous other manifestations have been described which call for further investigation before they should be accepted. On the other hand, there seems to be definite evidence that the frequency of mottled enamel is associated with a relatively low incidence of caries of the teeth. It also appears to be possible that a small amount of fluorine in water is beneficial while an excess may be a danger. Obviously the problems involved are complex.

RADIOGRAPHY OF THE CHEST IN RELATION TO PULMONARY TUBERCULOSIS.—The method of cine-radiography is already in use in the Services and the results of several large surveys have been published. So far as the civilian population is concerned this is still a time of preparation and organization. Preliminary difficulties are met with in the provision of the necessary apparatus and in the scarcity of physicians and radiologists who are qualified to express reliable opinions. Further difficulties will obviously arise in the civilian population in dealing with the subjects of tuberculosis who are thus discovered. Special thought will have to be given to the method of dealing with the sputum-negative case without symptoms in which the radiographic and clinical examinations suggest active infiltration. The subject is reviewed in a special article.

MALARIA.—It is difficult for those who have spent their lives in temperate climates to have a true conception of the importance of malaria. The question of which is the most prevalent disease in the world, set to a class of medical students, rarely provokes the answer of malaria, even after the claims of tuberculosis, venereal disease, cancer, and psychoneurosis have been adequately aired. Even laymen who have spent many years in the tropics have but a hazy idea of the ravages which it causes when a mass of men is suddenly exposed to infection for the first time. Medical services in many campaigns have failed to persuade combatant officers of the certainty of widespread infection if troops are required to fight in a given locality, and have witnessed their advice set aside with calamitous results. In the present war the Allies have been handicapped by the almost complete elimination of the sources of quinine. Fortunately atabrin has proved successful for suppressive treatment.

REHABILITATION.—The need to coin this ungainly term is somewhat of a reflection on hospital treatment and hospital staffs. It applies primarily to the supervision and treatment of patients during the later stages of disease and disability. The general practitioner has automatically performed these duties and has found no need to designate a special word for what he has done in the ordinary course of his practice. But when a patient is fit to leave hospital or a nursing home the specialist tends to

turn his attention to the next occupant of the bed. Perhaps the needs of war have anticipated the golden era envisaged in the White Paper. Once it has come into power the realm of rehabilitation has rapidly extended and spread backwards to the earliest beginnings of hospital or other treatment. While it should be given every encouragement within its proper boundaries, care should be taken lest its beneficent sway becomes a dictatorship. The subject is reviewed in a special article which emphasizes the need for co-operation between all those responsible for bringing the patient into the position of maximum health and usefulness.

SULPHONAMIDES.—The enormous flood of publications on sulphonamides and the introduction of new compounds have to a considerable extent abated during the last twelve months. This diminution is not in any way due to failure of earlier promises but rather to their well-established and undoubted success. Possibly in one or two directions the august nose has been put out of joint by its young rival penicillin. But there is no doubt that both will exist side by side as two of the greatest glories of modern medicine.

DYSPEPSIA, PEPTIC ULCER, AND GASTRITIS.—Dyspepsia and peptic ulcer in the Services, which caused so much confusion in the early days of the war, have now fallen into a more proper perspective and are dealt with by more satisfactory routine. So far as one can judge by the scanty literature available, Germany has had problems closely similar to our own. Gastrosocopy still continues to add to our knowledge of the gastric mucous membrane, but the greatest advance during the last twelve months is the work of F. Wolf and H. G. Wolff on the 'new Alexis St. Martin'. Their observations will appreciably alter some of our views on the development of ulcers and the nature of the lesions at present described as chronic gastritis.

SURGERY

GENERAL SURGERY.—Massive oedema of the arm following removal of the breast for carcinoma may be a terrible affliction; a possible mode of relief is to anastomose the upper arm to the chest wall, to provide new lymph drainage. A useful technique is described for nail or splinter punctures of the sole of the foot; after soaking, the epidermis is cut away, foreign matter extracted, and tetanus antitoxin administered. A writer points out how much preferable the vastus externus is for large injections, rather than the buttock or deltoid. The best treatment for varicose veins of the thigh and upper leg, if the internal saphena is mainly involved, is ligation and division as high as possible, followed by retrograde injection with some sclerosing agent. [A ureteral catheter is excellent for this purpose.—Ed.]

WAR SURGERY.—It is abundantly clear that wounded men in the present war have a much better chance of recovery than in any former

conflict. Many factors contribute to this happy result. There has not been much fighting, where British and American troops have been engaged, over heavily manured soil ; wounds are often caused by minute fragments travelling at a high speed which do not carry in bits of dirty clothing ; early excision, and the use of tetanus toxoid, penicillin, and the sulphonamides, all help greatly ; and plaster splinting facilitates transport and protects against secondary infection. Some information has come in as to methods of treatment of wounded in Germany, and an interesting article deals with this subject, though there does not seem to be much to learn. It is recommended that a rapid blood transfusion be given to save a limb threatened with gangrene after ligation of a main artery.

The resuscitation of persons apparently drowned has been further studied and a rocking method of performing artificial respiration is reported to be greatly superior to the old-fashioned procedures, though these have to be used until the rocker can be got ready. The importance of a cold, dry treatment for 'immersion foot' is again emphasized, and an interesting article on the subject is included. Blast injuries of the abdomen have received further attention ; the sequence seems to be bruising of the bowel followed by gangrene and perforation ; the entrance of sea water by the rectum may contribute to the damage.

ABDOMINAL SURGERY.—The death-rate from appendicitis in America, which reached a peak between 1920 and 1932, is falling steeply ; the earlier fall was due to health propaganda, and latterly to the use of sulphonamides. A warning is given that abdominal pain in patients with hernia is often due to some cause much more serious than the hernia ; repair with floss silk is losing favour—sepsis has been unpleasantly frequent. It is claimed that decompression by the Miller-Abbott tube has reduced the mortality in cases of intestinal obstruction from 30 to 10 per cent. It is suggested that severe hæmatemesis in cases of cirrhosis of the liver may be checked by ligaturing the coronary vein and injecting sodium morrhuate to obliterate the œsophageal varices. [This is not easy.—ED.] Not all cysts of the pancreas are suitable for surgery ; multilocular cysts not due to trauma are best left alone. Successful cases of removal of islet-tumours of the pancreas continue to be reported ; a suitable case will present a combination of central-nervous-system symptoms of some sort, coming on during the fasting state, relieved by giving sugar, and associated with hypoglycæmia.

SURGERY OF CENTRAL NERVOUS SYSTEM.—In war injuries of the brain, the prognosis depends very much on the state of consciousness when first seen ; of those in coma, the great majority die, whilst those who are mentally alert nearly all recover if they receive efficient early treatment. Local application of sulphonamide in powder form needs discretion ; sulphathiazole, for instance, causes convulsions, which may be fatal. In an interesting study of headache, it is suggested that reduced intracranial pressure is a commoner cause than a rise ; the headache of tumours seems

to be due to drag on the vessels or dura ; post-traumatic headaches are often functional. Several articles deal with the much debated question as to how many patients with sciatica need an operation to relieve pressure caused by bulging nucleus pulposus ; there is some evidence that " brachial neuritis " may be due to pulposus lesions of the lower cervical spine.

CHEST SURGERY.—New hope has been raised for sufferers from carcinoma of the lower end of the œsophagus by the prospect of removal of the growth through the pleura, with anastomosis of the end of the œsophagus to the fundus of the stomach drawn up through the diaphragm ; a long article is included on this important subject. Traumatic hæmothorax is best treated by early aspiration.

RECTAL SURGERY.—Nearly every case of carcinoma of the rectum can be diagnosed by a simple digital examination, but in a recent study lamentable evidence is adduced that doctors neglect their duty in this matter, and miss the disease in its early and operable stages. Blood transfusion, post-operative administration of oxygen, and early movements of the legs, with a prophylactic dose of " anti-peritonitis " vaccine, have helped to reduce the mortality of the abdomino-perineal resection to a very low figure. Cystitis and retention are still troublesome complications.

GENITO-URINARY SURGERY.—The outstanding discovery in this field is that stilbœstrol, with castration, will usually give great relief in cases of carcinoma of the prostate. The results are described as " quite phenomenal ". Anuria due to the sulphonamides, especially sulphapyridine, is becoming " a positive menace ", especially amongst Orientals. The best preventive is to give abundant fluids, and alkalis. If ureteral catheterization fails, massage per rectum may succeed in clearing the crystals from the lower ureters. Incisions for suprapubic drainage ought to be placed as high as possible, to allow a collecting appliance to be fitted. Pyuria without bacteria can often be cured by a few doses of novarsenobenzol. The addition of calcium to the diet enables patients with oxaluria to take coarse vegetables safely. It is better to remove a urethral caruncle by excision than by cautery. The " neutral red " test for the reaction of the urine, and the " Scotland Yard " test for blood in the urine, are commended for wider employment in general practice.

ORTHOPÆDIC SURGERY.—Route marching and Army training have directed attention to acute foot strains ; the foot is mobile, but the power of flexion of the toes against resistance is impaired ; at a later stage there is tenderness of the attachments of the plantar fascia ; rest is essential, though other treatments may well be added. Fracture of the femur can be treated efficiently by means of mechanical fixation with pins fixed in a special clamp ; the patient can then walk about. Pain at the wrist may be due to tendo-vaginitis at the radial styloid, with

thickening, tenderness, and pain when the hand is deviated towards the ulna with the thumb flexed in the palm; the treatment is operative, the object being to split the dorsal carpal ligament overlying the tendon of the extensor brevis pollicis.

SURGICAL DISEASES OF CHILDREN.—The distressing overgrowth of bone following amputations at an early age, giving rise to conical stump and calling for repeated operations, may be prevented by curetting out the epiphysal cartilage at the proximal end of the bone. Cases are reported of successful operation for intestinal obstruction in the newborn caused by atresia of the duodenum. More and more children suffering from acute osteomyelitis are being treated by mobilization, antistaphylococcal serum, sulphathiazole, and intravenous infusions, instead of early operation.

SPECIAL DEPARTMENTS

OBSTETRICS AND GYNÆCOLOGY.—Much attention has been directed lately to hæmolytic disease in the newborn, which may lead to the loss of one infant after another; in certain cases this is due to the marriage of a man with the Rhesus factor in his blood with a Rhesus-negative woman; the children will be anæmic and jaundiced; treatment is by transfusion with an agglutinin-free Rhesus-negative blood. We would call attention to a special article on toxæmia of pregnancy and its differentiation from essential hypertension. Various synthetic oestrogens are now on the market and are valuable in stopping unwanted lactation, and for menopausal symptoms; their relative value and correct dosage are discussed.

OPHTHALMOLOGY.—Vitamin E is said to be helpful in the treatment of interstitial keratitis. Some preliminary observations on the value of penicillin, locally applied, in various eye conditions, are noticed. An account is included of a hitherto little appreciated cause of eyestrain and discomfort called aniseikonia, which can be relieved by suitable lenses.

EAR, NOSE, AND THROAT SURGERY.—Headache may frequently be due to disorders of the nose and nasal sinuses, and a good deal of interest has been taken in this subject recently, but surgery should be a last-resort treatment in such cases; "the literature of headache is deeply tinged with the personal experience of authors". The outlook in cases of otitic meningitis has been greatly improved since sulphonamides have been used, but surgical drainage and elimination of the primary focus are not to be under-rated.

VENEREAL DISEASES.—Chancroid is more resistant to prophylactic measures than other venereal diseases, but clears up under sulphonamide treatment, general and local. It is becoming evident that some strains of gonococci are resistant to these drugs, but they are not also resistant to penicillin, which is a most potent and effective weapon in the treatment

of gonorrhoea. The five-day massive dosage of arsenicals for early syphilis has aroused much interest ; it may be given by slow or rapid intravenous injection. Mapharside is now used by some medical officers as the routine treatment for syphilis in the Royal Navy, as it is less likely to give rise to jaundice ; it is at least as efficient as neo-arsphenamine. Army experience with American negro troops shows that dosage with sulphathiazole is of considerable value as a prophylactic against gonorrhoea, but it is by no means an absolute protection.

ANÆSTHETICS.—Newer methods are passed in review. A very useful chart for making and preserving records is illustrated.

BLOOD-TRANSFUSION : THEORY AND PRACTICE.—The intensive study and experience induced by war requirements has called forth a voluminous literature on this subject, and a long summary of recent work is included. Blood-grouping has become highly complicated, and experts now know the reasons for, and can avoid, unfortunate and unexpected reactions. Splanchnic block may relieve the symptoms of an incompatible transfusion. Pyrogenic substances may be present in sodium citrate, giving rise to rigors ; filtration through asbestos will obviate the risk.

RADIODIAGNOSIS.—Growths of the pancreas, without jaundice, are difficult to diagnose, but cysts and neoplasms give rise to suggestive X-ray signs. A caution is entered concerning the value of mass radiographic examinations of the chest.

RADIOTHERAPY.—Some important new types of apparatus, such as the cyclotron, are described. It is possible to bring a much bigger dose of X rays to bear on a neoplasm by reflecting skin-flaps, replacing them after treatment. Carcinoma of the œsophagus presents a grim therapeutic problem, but a number of cases successfully treated by radiotherapy are presented. Osteoclastoma often swells as the initial result of X-ray treatment, and may seem worse, but the tumour cells are killed and re-ossification occurs later. Radiotherapy probably has a place in the treatment of peritonitis and other septic conditions. Concerning radium treatment of cancer of the uterus, in one clinic nearly half the patients completely treated were alive five years afterwards.

REVIEW OF THE YEAR'S WORK

ABDOMEN, WAR INJURIES OF.

A. Rendle Short, M.D., F.R.C.S.

Doubtless a number of publications will shortly appear dealing with this subject. In the meantime we notice two. The first, by Sir James Walton,¹ gathers up the experience of the past, reinforced by the effects of air-raid bombing over London. It is well known that a soldier may suffer from *evisceration* without much shock, and even walk to a dressing station supporting his intestines in his hands. The bowel should be washed with sterile saline, dusted with sulphanilamide, and replaced. At a first-aid post, a few stitches should be inserted to close the abdomen. At hospital, or casualty clearing station, the abdominal wound is excised, the peritoneum closed, and the muscular wound dusted with sulphanilamide and packed with vaseline gauze. An incisional hernia will no doubt result, and require closure later.

Crush injuries may result from the blast of explosion, or from falling masonry. Shock is severe, and the most probable internal damage is likely to be a ruptured liver, spleen, or kidney. There may of course be associated fractures or concussion. It is often wisest to wait a few hours for the shock to be treated. Sometimes the bleeding ceases, and a firm mass may develop, especially in the perirenal region. This will gradually decrease, and perhaps disappear in a month or so. Signs of internal hæmorrhage, or rigidity and shock, pain, and absence of abdominal respirations, call for laparotomy. If the liver is torn, it should be sutured with very stout catgut. This holds better than is generally believed. Ruptured spleen calls for splenectomy. Ruptured kidney can be sutured, or, if the hilum is damaged, it may need to be removed. It is very necessary to search the stomach and intestines for multiple perforations, especially the posterior surface of the stomach. Closure of perforations is usually better than resections. Holes in the large intestine should be treated by exteriorizing the colon and making a temporary colostomy. If the rectum or pelvic colon is involved, the wound should be sutured, and a colostomy performed proximal to it.

Another article comes from a forward operating area in the Middle East, from the pen of C. A. M. Renou,² an Australian surgeon. Cases were classified into four groups: those in good condition, the shocked, those with internal hæmorrhage, and patients with peritonitis (rare). The abdomen was screened, with the surgeon present, for foreign bodies, in all cases except those where a rifle or machine-gun bullet had gone in and out. Small gunshot wounds were untouched except for sulphanilamide powder and vaseline gauze. Large posterior wounds were left open and not sutured. Wounds of the gut were sutured. After-treatment was morphia, nil by mouth, and continuous intravenous saline drip (glucose-saline). Sulphanilamide was given by mouth, or, if vomiting occurred, by the intravenous route. Persistent vomiting called for drainage by the Rehfuß tube. Stomach perforations were usually fatal. Of 29 cases of wound of the small intestine, 9 were saved. Of 25 cases of wound of the colon, 10 were saved; in only one was colostomy deemed advisable. Three out of 5 bladder cases were saved. Wounds of the solid organs did better; liver 6 out of 7 survived, kidney 7 out of 9, spleen 4 out of 6.

Late Complications.—Upper abdominal wounds are very liable to produce pulmonary collapse. War wounds of the abdominal wall are apt to burst open. According to Surgeon-Commander F. Stabler,³ the best treatment is not to close layer by layer, but to use a continuous catgut suture for the posterior sheath and peritoneum, and then sew up the muscles and skin with deep through-and-through interrupted silk-worm gut, with half-inch gaps for drainage. If the wound bursts open later, the peritoneum will probably hold, and it may be sufficient to bring the muscles together with elastoplast strips. An incisional hernia will result, but a belt is often sufficient treatment. Operative closure will be difficult. Abscesses in the peritoneal cavity may show the way to a foreign body. Subphrenic or pelvic abscesses require opening, but those in the soft parts of the abdomen, with no foreign body, often drain away of their own accord, and are best left alone. For paralytic ileus, the Miller-Abbott tube, with intravenous saline, is a life-saving device. Fæcal fistulæ usually heal. The general rule to be followed is, for the immediate complications of abdominal wounds, operate at once; for the late complications, don't.

Blast Injuries of the Abdomen.—These have aroused much interest. (*See MEDICAL ANNUAL, 1943.*) It is strange that they attracted so little attention in the last great war. They are usually the result of explosions under water affecting men swimming. D. D. Pinnock and P. Wood⁴ describe the effects of the explosion of two depth charges. Naval men whose ship had gone down were in the water near. Those on rafts, or at a distance, escaped injury. Five were sufficiently ill to be taken to hospital, and four of them died. The abdomen was rigid and tender, pulse-rate rising, and blood-pressure falling. Two were operated on, and bursts of the colon and of the small intestine (multiple) were found. It is remarked that the patients did not look as ill as they were, and an earlier laparotomy might have saved some of them. The sequence seems to be bruising of the bowel, followed by gangrene, then perforation.

An American account comes from L. S. Auster and J. H. Willard,⁵ two naval surgeons. Sea water is usually forced into the bowel through the anus, and within half an hour the patient may have several fluid stools with cramp-like pain. Early operation is not indicated, unless and until signs of perforation show themselves. Treatment of small perforations and patches of intramural intestinal hæmorrhage and concussion is most successful with morphine, indwelling intestinal suction, and intravenous infusions of electrolyte, dextrose, and plasma. In cases operated on, several examples of longitudinal tears of the colon were found.

REFERENCES.—¹*Brit. med. J.* 1943, 1, 61; ²*Aust. N.Z. J. Surg.* 1942, 12, 123; ³*J. R. nav. med. Serv.* 1943, 29, 103; ⁴*Brit. med. J.* 1943, 1, 537; ⁵*J. Amer. med. Ass.* 1943, 121, 995.

ABDOMINAL SURGERY, MISCELLANEOUS.

A. Rendle Short, M.D., F.R.C.S.

Effect of Post-operative Intercostal Nerve Block on Pulmonary Ventilation.—Arnold Starr and S. Gilman,¹ of Indianapolis, demonstrate with the spirometer the reduction of breathing following an operation on the upper abdomen, and show that blocking the intercostal nerves in the mid-axillary line reduces pain and assists deep breathing and coughing, for about five hours. The mid-axillary line is chosen, to avoid the motor fibres to the intercostal muscles.

The Mikulicz Pack.—Mikulicz first advised the use of a gauze pack to wall off large unperitonealized surfaces, after pelvic operations, in 1886. This may well be modified by enclosing the gauze pack in a sheath of rubber-dam. The gauze is removed by degrees, from the fourth to the eighth or eleventh days. T. E. Jones, J. R. Paxton, and R. E. Brubaker,² of Cleveland, speak very favourably of its use to prevent adhesions when the omentum is too scanty to be used to

cover large raw areas left by separating an adherent inflammatory mass. It also has the advantage of limiting the spread of the infection, and providing drainage. None of the alleged unpleasant consequences materialized in their patients.

Radiological Studies after Laparotomy.—According to J. Levitin and L. M. Trauner,³ of San Francisco, a positive X-ray diagnosis of mechanical obstruction is reliable evidence, regardless of the presence or absence of clinical symptoms. The converse does not hold true; mechanical obstruction may be present which gives no conclusive X-ray signs. The differences between the appearances in obstruction and in paralytic ileus are given as follows :—

MECHANICAL OBSTRUCTION	PARALYTIC ILEUS
1. A continuous distension to the point of the obstruction	Scattered loops of distended small and large bowel
2. Loops few and large	Loops many and small
3. Dynamic appearance of bowel	Adynamic appearance of bowel

Retroperitoneal Lipoma.—Reporting 7 cases, treated at Buffalo, J. S. Regan, S. Sanes, and J. D. MacCallum⁴ found that women past middle life were most frequently affected, and the fatty tumour was usually on the right side. Œdema, pseudo-cyst formation, inflammation, hæmorrhage, and sarcomatous changes were observed. In those patients who had any symptoms at all, the usual complaint was of abdominal distension and œdema of the legs, or of dyspnoea and vomiting. In 4 cases the tumour was removed, but it was necessary in one case to remove the cæcum and ascending colon, and in another the kidney and adrenal. One patient died.

Peritoneoscopy.—J. S. Chaffec,⁵ of Cleveland, advises surgeons to learn the technique of this method, and how to interpret the appearances, by practising on the cadaver.

REFERENCES.—¹*New Eng. J. Med.* 1942, 227, 102; ²*Ann. Surg.* 1943, 117, 250; ³*Surg. Gynec. Obstet.* 1942, 75, 510; ⁴*Ann. Surg.* 1943, 117, 110; ⁵*Ibid.* 1942, 116, 843.

ADRENAL GLANDS.

Sir Walter Langdon-Brown, M.D., D.Sc., F.R.C.P.
Samuel Leonard Simpson, M.A., M.D., F.R.C.P.

ADDISON'S DISEASE

Evaluation of Synthetic Desoxycorticosterone Acetate Therapy.—G. W. Thorn, S. S. Dorrance, and E. Day¹ report a large series of 158 cases, 64 of which came under their direct care. They were treated both by injections and pellet implantation, without large supplementary quantities of salt. After an initial period, the majority of patients required a maintenance injection dose of less than 5 mg. of desoxycorticosterone per day. The dosage of pellets was based on a calculation that one 125-mg. synthetic pellet will yield 0.5 mg. of hormone daily; and it was found that such pellets provide effective therapy for 12 months. A gradual reduction in blood-pressure indicated an inadequate supply of the hormone. The pellets were implanted subcutaneously in the intrascapular region. Unlike cortical extract, desoxycorticosterone had no influence on glyconeogenesis or creatine excretion. In a crisis, or during periods of acute infection, it was found advisable to supplement therapy by the addition of cortical extract. Blood-changes produced by desoxycorticosterone were— increase in plasma volume, decrease in sodium-chloride excretion, increase in excretion of potassium and inorganic phosphorus, increase in carbon-dioxide-combining capacity, decrease in non-protein nitrogen, and decrease in hæmatocrit and serum protein.

T. H. McGavack² records his experience with 6 patients, and comes to the conclusion that the average daily dosage of desoxycorticosterone by injection

varies between 5 and 20 mg., and that the intake of sodium should conform to the normal range of sodium intake, namely, 3 to 6 g. Any alteration between the balance of these two factors might produce over-dosage, as indicated by sudden gain in weight, cedema, malaise, hypertension, and, in his opinion, an important early sign, an increase in the cardiothoracic ratio above 0.50. The latter is the ratio between the transverse diameter of the heart and the transverse diameter of the chest, determined radiographically.

D. M. Dunlop³ found that desoxycorticosterone acetate dissolved in propylene glycol and dropped under the tongue was effective in Addison's disease, even to the extent of producing cedema when sodium chloride was given. Small tablets of desoxycorticosterone acetate allowed to crumble and absorb under the tongue (4×2.5 mg. daily) were also effective, but both methods were wasteful and cumbersome. Dunlop also formed the opinion that intramuscular injections, although more effective, are inconvenient to the patient. The method of choice was found to be the subcutaneous implantation of 200 mg. of desoxycorticosterone, which proved effective in three patients, a single implantation lasting from six to eight months.

F. L. Engel, C. Cohn, and L. J. Soffer⁴ find subcutaneous implantation of pellets of desoxycorticosterone to be the method of choice, and that pellets of 125 mg. in size should last about eleven months. The authors suggest that the dosage can be calculated on the basis of one pellet yielding 0.3 mg. of the hormone daily, but warn that toxic effects may be produced if a preliminary course of injections is not given to ascertain the minimal maintenance dose.

THE SYNDROME OF HÆMORRHAGIC SUPRARENAL INFARCTION

Hæmorrhage into the suprarenals, when occurring in infants, frequently associated with meningococcal meningitis, is usually fatal, and is called the Friderichsen-Waterhouse syndrome. It is rarely diagnosed in life. D. V. Keele and K. D. Keele⁵ describe a case of a fatal unilateral suprarenal hæmorrhage in a woman of 32, eight months pregnant, and review ten cases in adults from the literature, associated with various disorders, e.g., carcinoma of the bronchus, pancreatitis, and chronic nephritis. They suggest that diagnosis can be made in life by: (1) the site and character of the pain—in this case to the right of the umbilicus, 2 in. below the ribs, localized, severe, "stitch" or "cramp"; (2) severe intractable vomiting; and (3) absence of shock as judged by pulse and blood-pressure. The chemical changes are not in keeping with the severe adrenal insufficiency of Addison's disease. Actually the patient died from a severe pulmonary hæmorrhage, and at autopsy the lungs showed diffuse hæmorrhage filling the bronchioles in the substance of both. The suprarenal vein was thrombosed, and the right suprarenal was the size and colour of a large plum, blood spurting from it on section. [In infantile cases the pulse-rate may be very rapid.—W. L.-B.]

REFERENCES.—¹*Ann. intern. Med.* 1942, **16**, 1053; ²*New Engl. J. Med.* 1942, **226**, 547; ³*Brit. med. J.* 1943, **1**, 558; ⁴*J. Amer. med. Ass.* 1942, **120**, 1430; ⁵*Brit. med. J.* 1942, **2**, 687.

AGEING.

Macdonald Critchley, M.D., F.R.C.P.

National service and shortage of man-power demand the optimum utilization of our resources, and the correct allocation of jobs. Square pegs in round holes must be avoided at all costs. Not the least of the difficulties in this field is the question of the appointment of the elderly, whether in the Services as high-ranking officers, or in civilian posts. Calling-up of younger men has caused the elderly to take their places in offices and factories. Retired naval and army officers are brought back and re-employed, and the problem must be faced as to how far such men are physically and mentally fit to undertake responsible jobs; to carry

out exacting and arduous duties; to endure the rigours of arctic and tropical conditions. We know to-day the successes achieved by retired and elderly naval officers, re-employed in the lower rank of Commodore of convoys and thrust among the hardships and hazards of trans-oceanic runs.

At the same time there is always a contrapuntal murmuring against the appointment of the elderly to administrative posts within the fighting services as well as the legislature. The mental rigidity of old age is contrasted unfavourably with the drive, freshness, and vigour which are widely assumed to be the prerogative of the younger man. In wartime, therefore, the clamour for younger admirals, younger generals, and younger statesmen grows louder.

The medical aspects of old age thus become of some topical interest, and justify an appeal for further exact scientific studies of the subject. At what age do the processes of senescence begin? What is the nature of ageing itself—is it an essential unavoidable biological process of involution—or is it a matter of pathology—the resultant of life's accumulated wear and tear—one which, in theory at any rate, might be staved off, if not avoided altogether? Which physiological functions first show the marks of senescence? Are the earliest changes physical or psychological? At what period are the majority of mental and physical faculties at their peak—in other words, what age constitutes the “prime of life”?

With these interesting and not unimportant ideas in mind, we may turn to the collection of papers edited by E. V. Cowdry,¹ Professor Pearl's lecture,² and the recent papers by V. Korenchevsky.^{3,4}

The last-named quotes the results of tests of certain physiological activities at various ages. In most cases a decrement sets in at 30, and in the case of some faculties, at the age of 25. Bone vibratory sensibility, for instance, is at its nadir in adolescence or even childhood. Auditory acuity is at its best between 5 and 13. The relative weights of various vital organs begin to decrease in early infancy. If we believe that a diminution in elasticity of the lens of the eye is a hall-mark of age, then we must conclude that senescence sets in at birth, when the range of accommodation is at its optimum, and whence there is a steady decline.

At the age of 60 the curve of decrement in many of these functions takes a sharp turn downward, and in the case of visual acuity and vibratory sensibility this abrupt change may occur as early as 50.

A certain amount of play has been made with the argument that achievement and productivity—intellectual or artistic—is greatest in early adult life. Lehman believed that most outstanding contributions in science have been made at 30 to 34 years, while most literary masterpieces have been published by men less than 45 years of age—most often by writers still in their thirties. That many exceptions to this dictum occur is not surprising, and need not be particularized.

Psychological tests are even more significant, and they offset to some extent the idea that physiology would suggest of the “prime of life” being situated somewhere in infancy or early childhood. Although these psychometric studies need amplifying, those available are suggestive. Judged by such tests as reaction times to auditory and visual stimuli; co-ordination tests; visual perception; otis tests, etc., there is on the average a steady decline after the age of 25. Nevertheless there are important and not infrequent exceptions. Thus Miles found that sometimes people aged 50–69—or even 70–89—were able to perform motor, sensory, and intelligence tests as well as, or better than, on the average, subjects of 18–29 or 30–49. Conversely, some young people performed these tests as badly as—or worse than—(on the average) the old. Miles's comments on this point are worth quoting: “Generalizations concerning the effects of

age should certainly not be based on averages alone. . . . There are younger individuals whose work is poorer than the average of the older, and older individuals who exceed the averages in their individual performances. . . . Basically, physiological function of rate of response shows greater age decrement, while the more psychological function of mental experience holds off the negative age influence. . . . Exceptions occur largely in terms of greater or less practice and experience, and these exceptions may be the stimulus to endeavour on the part of those who wish to develop skill with age, offsetting through wisdom or continual exercise the necessary decrement in the functions of physical receptors and effectors."

The key-word here, of course, is "wisdom", which we are told, comes with age; Korenchevsky aptly gives us a definition of wisdom: "Natural intelligence of a high order, together with acquired manifold experience and knowledge, and sagacious insight in deliberation and judgment."

Even those who believe firmly in the "physiological" or involutionary nature of old age can scarcely deny that exogenous processes can have a deleterious and aggravating action upon senescence. The appearance of premature age in certain classes—e.g., active service naval ratings—is striking, though difficult to explain. Alcohol; tobacco; excessive physical exertion; certain diseases; exposure to climatic extremes; multiparity in the case of women; personality traits—all have been suspected as potent factors in accelerating senility. But exact data are sadly lacking. Pearl² has concluded that moderate consumption of alcohol does not significantly shorten life when compared with total abstinence; but that heavy drinking does seriously curtail the expectation of life. The tobacco habit, however, seems definitely to be associated with shortened life, and the amount of curtailment appears to be directly proportional to the quantity of tobacco smoked. Hard physical labour before the age of 40 does not seem to affect the mortality-rate, but after about the age of 40-45 it seems that life is shortened directly according to the amount of heavy physical labour endured. Most severe physical diseases bring in their wake a certain tendency towards ageing, but outstanding among them are, of course, arteriosclerosis and some endocrinal disorders. Korenchevsky has been particularly impressed with these latter, and he quotes clinical correspondences between underactivity of the gonads, the adrenals, and the thyroid, and the manifestations of premature old age. Whether the idea will stand up to scientific scrutiny is not yet clear. Neither are the attempts at correlating states of hypovitaminosis with early ageing at all convincing.

Climatic factors might be significant, and here it seems likely that an environment of extreme heat is more noxious than one of extreme cold. The premature blooming and wilting of women in the tropics—whether native or European—is notorious, while on the other hand, it is interesting to note the longevity of the Icelanders, as well as their reputed low incidence of arteriosclerosis.

An inherited long-lived constitution is of course the most obvious factor in longevity, as well as in the preservation of mental and physical vigour in the aged. As a factor which probably ranks only second to this, is the possession of an equable placid temperament. As Pearl has well stated: "for a variety of forms—including plants, various lower animals, insects, and men—the length of life is generally in inverse proportion to the rate of living."

The practical upshot of the problem, as we see it at present, is that certain advantages may accrue from the employment of experienced and well-preserved elders. In such, the factor of "wisdom" offsets the loss of mental elasticity, speed in cerebration, retentive memory, inventiveness, and imagination which may be considered as lost with the passage of years. A certain risk is run, however, for wisdom does not necessarily come with age, and attributes of youth

may be lost without the development of compensating qualities. The practical test of "life"—as so often is the case in the province of psychology—proves superior to any academic or experimental test. In other words, achievement may be regarded as the clue to the employment of the elderly; for if middle life has not brought forth its fruits, they cannot be expected to appear in old age. Hence the merits of the traditional practice of retirement within the Services, where the age of going-out increases according to the rank.

REFERENCES.—¹*Problems of Ageing*, 1939, London; ²*Landmarks in Medicine*, Laity Lectures of the New York Academy of Medicine, London, Appleton Co.; ³*Ann. Eugen., Camb.* 1942, 11, 314; ⁴*J. Amer. med. Ass.* 1942, 119, 624; ⁵Editorial, *Brit. med. J.* 1939, 2, 811.

ALCOHOLISM.

Aubrey Lewis, M.D., F.R.C.P.

Professor G. Dahlberg¹ of Upsala has examined statistically the records of alcoholic persons referred to the official Temperance Boards in the town of Malmö between 1929 and 1938. Many of his data and conclusions are of social importance, though they cannot be divorced from their Swedish setting. It is noteworthy that those alcoholics who were sent into an institution when first reported to the Temperance Board have done better than those who were warned or put on probation; this is all the more striking since these would have been the most serious cases. Dahlberg insists that vigorous rather than lenient measures should be adopted whenever possible, and that a special institution for short-term treatment gives the best results. Dahlberg does not favour long periods of in-patient treatment; two months is, in his opinion, sufficient. Of 1162 male alcoholics studied, 27 per cent had been convicted at least once of some crime other than drunkenness; 23 per cent had been convicted of theft, and 13 per cent of assault. Half the women studied had been sentenced for some offence, usually vagrancy.

J. Thimann² describes a slight modification of the method of treating alcoholism introduced by W. L. Voegtlin and F. Lemere (*see* MEDICAL ANNUAL, 1942, p. 17). Thimann has found that the doses of pilocarpine and ephedrine they recommended caused painful spasm of the bladder and colon, and blurred vision; the amount of pilocarpine was therefore reduced and that of the ephedrine increased, and the two were given together instead of the ephedrine being given one hour before the emetic.

F. Lemere and W. L. Voegtlin³ give further figures indicating the success of their method. Half of those followed up during a period of 2 to 4 years still abstain from alcohol, and three-quarters of the 644 treated in the last two years are also still abstinent. Patients under 30 years of age and professional men and women have proved especially difficult to treat; re-treatment of those who relapsed had been effective in only about a quarter of the cases. Lemere, in reply to criticism, agreed that many of the patients in this series were responsible people who did not show any psychopathy except when they were drinking. He had found that unless the patient wanted to stop drinking it was impossible to help him.

M. M. Miller⁴ has carried out a programme of treatment for chronic alcoholism in which familiar medical methods, including the administration of benzedrine, were combined with psychotherapy and social rehabilitation. The total treatment ranged from 4 to 14 months. They were first seen at a Municipal Court, after arrest, and thereafter treated as out-patients. There were 513 patients; at the end of treatment 487 were still in touch with the clinic, and of these 81 per cent were abstinent. Comparison of the subjects with others who did not get treatment show that 25 per cent of the treated group were arrested again for drunkenness, as compared with 42 per cent of the untreated group. The number of these patients receiving public assistance was halved as the result of

treatment. Miller stresses the value of co-operation with the Court and the use of a deterrent sentence for therapeutic purposes.

A. Myerson⁵ underlines the importance of alcoholism among American recruits. Of 31,746 men examined at a centre in Boston, 13,543 were rejected; and 383 of these were chronic alcoholics; 68 were alcoholics who had other neuro-psychiatric defects.

REFERENCES.—¹*Acta med. scand.* 1942, **111**, 325; ²*New Engl. J. Med.* 1943, **228**, 333; ³*J. Amer. med. Ass.* 1942, **120**, 269; ⁴*Ibid.* 271; ⁵*Quart. J. Studies on Alcohol*, 1942, **3**, 2.

AMOEBIASIS. *Sir Philip Manson-Bahr, C.M.G., D.S.O., M.D., F.R.C.P.*

A rather disturbing fact which has disproved preconceived ideas regarding the location of *Entamoeba histolytica* in the intestinal tract has been brought forward by H. Weselmann,¹ who has reported a case in which vegetative forms of this organism, with typical morphology and ingested erythrocytes, were discovered in duodenal contents removed by duodenal sound together with characteristic four-nucleated cysts. This investigation was undertaken because it was thought that the patient might be suffering from diarrhoea due to *Giardia intestinalis*, which is sometimes found in this situation. No amœbæ were found in the fæces.

The finding of amœbic cysts in the duodenum has previously been reported by Kolle and Hetsch, but this is apparently the first time that active forms have been so demonstrated.

Treatment with emetine caused rapid disappearance of all stages of *Entamoeba histolytica*.

Amœbiasis of the Penis.—The second case of amœbiasis of the penis is reported by H. B. Hermann and L. S. Berman.² The patient, a white U.S. soldier, was a native of Florida, where endemic amœbiasis exists. The case was most complicated, because a white spot appeared which gradually enlarged to an ulcer, one centimetre in diameter, on the under surface of the glans, some seven days after sexual exposure. At that time Ducrey's bacillus was isolated and later the Wassermann became positive. In the meantime the lesion would not heal, but spread considerably. Pain became intense, so that suprapubic cystotomy had to be performed. Some five months after admission *E. histolytica* cysts were found in the fæces and the ulcer exudate was found to contain myriads of cystic forms of *E. histolytica*. *Carbarsone* was then applied locally as a 0.5 per cent solution, with the result that healing set in and continued to complete cure.

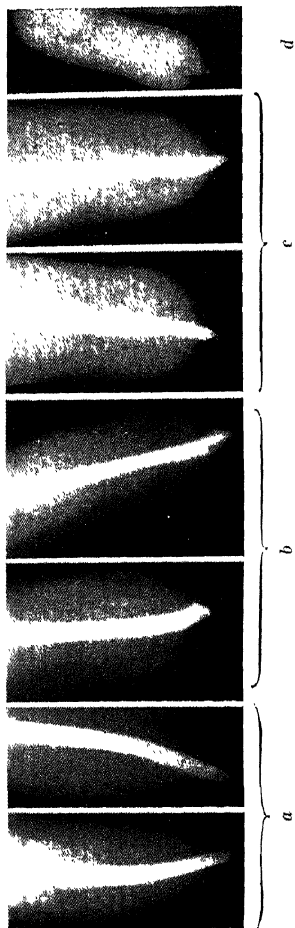
Aspiration and Air Replacement in Hepatic Abscess.—J. D. S. Cameron and N. A. Lawler³ state that aspiration, in combination with emetine injections, forms an important part of treatment of amœbic abscess of the liver. Surgical drainage should be properly reserved for those cases in which mixed bacterial infections have occurred.

Aspiration is especially recommended when combined with air replacement. The site of election for aspiration should be in the 8th to 10th interspaces in the mid-axillary line. Local bulging assists in the choice of site, but is usually present only when the abscess is large and aspiration has been too long delayed. Localized tenderness may lead to that point for choice of puncture. For the actual aspiration a two-way syringe with wide-bore needle, $3\frac{1}{2}$ to 4 in. in length, is preferred to Potain's aspirator, though the needle provided with the apparatus proved satisfactory. Pre-medication consisted of morphia gr. $\frac{1}{4}$ and hyoscine gr. $\frac{1}{100}$. Thereafter local anæsthesia sufficed by superficial and track infiltration to the surface of the liver. Following aspiration of as much pus as possible, air was forced in until pain was complained of, either in the liver itself or in the right shoulder. Replacement with air to half the volume of pus

PLATE I

AMPUTATIONS IN CHILDREN: SERIES SHOWING POST-OPERATIVE BONE GROWTH

(F. VON SAAL)



a, Pre-operative X-ray film of right humeral stump at age of 10 years (April, 1931); *b*, Ditto at 13 years (March, 1934), three years after first re-amputation; *c*, Ditto at 16 years (Sept., 1937), three years after second re-amputation; *d*, Pre-operative photograph showing bone protrusion Sept., 1937.

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evacuated apparently sufficed. Prior to aspiration the patient was screened by radioscopy in the erect position.

Suggested findings are : a high right diaphragm, local bulging of the right cupola, rough or blurred outline of the right diaphragm, shadowing of the right costophrenic angle indicating effusion. These signs, though very suggestive, are not absolutely diagnostic, but are usually more constant in subphrenic abscess, though the latter usually contains gas. It is advisable that further examination should be carried out on the day after tapping. Three radiographs should be taken after screening, in the antero-posterior position erect, in the lateral position erect, and in the antero-posterior position with patient lying on the left side. These three radiographs determine the position, shape, and size of the abscess cavity. The air outlines the upper part of the abscess, and, by superimposing the films, correct assessment of the size and outline can be obtained and an estimate of the residual pus made.

Examinations should be repeated a fortnight after aspiration, and thereafter at convenient intervals, to determine shrinkage of the abscess cavity and absorption of residual pus. The air is not absorbed for one month, and the need for further aspiration is thus determined, so that further air replacement can be carried out. This method has been applied to 12 cases of hepatic abscess with favourable results.

REFERENCES.—¹*Dtsch. trop. Z.* 1942, 46, 457; ²*J. Amer. med. Ass.* 1942, 120, 827; ³*J. R. Army med. Cps.* 1943, 80, 1.

AMPUTATIONS. (*See also* WAR SURGERY.)

AMPUTATIONS IN CHILDREN.

Sir John Fraser, M.Ch., F.R.C.S.Ed.

Frederick von Saal¹ draws attention to a detail of practical importance which may arise when a child is the subject of an amputation. It concerns the development of disproportionate growth between bone and soft tissue. When an amputation is performed it is unlikely that the blood-supply of the proximal growth centre (metaphysis) of the bone concerned will be disturbed; growth in length continues therefore. In the soft parts, on the other hand, the position is different; a diminished blood-supply, a defective collateral circulation, combined with disturbance of the vasomotor control, are apt to lead to vascular and nutritional changes which inhibit the normal rate of growth, with the result that the bone exhibits a length out of proportion with the soft parts, and the stump presents the appearance of a pointed cone with, it may be, a pressure ulceration of the skin overlying the bone end. The complication is likely to arise in situations where the growth of the bone is dependent mainly on the activity of the proximal metaphysis. It applies in the tibia and in the humerus (*Plate I*), and thus it is that amputations implying division of these bones are liable to be associated with the complication of disproportionate growth. The development is uncommon in thigh amputations, because the upper epiphysis of the femur plays the lesser part in length growth. Saal quotes figures in support of his statements; in 20 cases of amputation below the knee 80 per cent (16 cases) subsequently exhibited disproportionate bone growth; in 20 amputations at thigh level the incidence of the complication was 25 per cent (5 cases).

To prevent the development of this troublesome error, Saal recommends that an epiphysiodesis be carried out either at the time of amputation or a month later. This means the destruction of the epiphysial cartilage immediately proximal to the amputation level by a process of curetting with a Volkmann's spoon through a small overlying incision.

Saal's observation will interest the pædiatric surgeon: disproportionate growth in the limb stump of a child is a disturbing complication, and the repeated amputations which it may necessitate are a source of distress and suffering to parents and child, so that a reliable means of preventing its appearance will be welcomed.

REFERENCE.—¹*Surg. Gynec. Obstet.* 1943, **76**, 708.

ANÆMIA, HÆMOLYTIC.

Stanley Davidson, M.D., F.R.C.P.

H. W. Fullerton, M.D., M.R.C.P.

An excellent review of the recent literature on this subject is given by L. J. Davis.¹ The article contains a valuable analysis of 47 cases of subacute and chronic hæmolytic anæmia (acquired acholuric jaundice) described in the British and American literature since 1932, and the following conclusions are drawn: Blood transfusions are likely to be of only temporary benefit but should always be tried. Every precaution should be taken to avoid the reactions which occur not uncommonly in this type of case. The question as to whether splenectomy should or should not be performed usually arises sooner or later. The operation was done in 30 of the 47 cases referred to, with improvement in 13, no effect in 7, and death soon after operation in the remaining 10. Of these 30 cases 18 showed increased red-cell fragility, and in 12 of these good results were claimed for splenectomy. In the remaining 12 cases the red-cell fragility was normal, and in only one of these did improvement follow the operation. This is a point of considerable interest, since it suggests that splenectomy is more successful in the type of case with hæmatological features like those of congenital acholuric jaundice. [Nevertheless the reviewers have seen considerable improvement follow splenectomy in some cases (unpublished) with normal fragility, and are of the opinion that the operation is justified in idiopathic cases irrespective of the fragility if a full trial of blood transfusions has proved unsuccessful.]

Pathogenesis of Familial Acholuric Jaundice.—It is a characteristic of this disease that a proportion of the red cells are of smaller diameter and of greater thickness than normal erythrocytes, a peculiarity known as micro-spherocytosis. These cells show decreased resistance to hypotonic saline and so are responsible for the increased erythrocyte fragility which is a well-known feature of this disease. Within recent years there has been considerable discussion about the causation of this spherocytosis. The older view is that there is an inherent defect in erythropoiesis whereby the marrow directly produces variable numbers of spherocytes. More recently, however, Dameshek and Schwartz² have contended that the erythrocytes are normal when they enter the circulation but that some become more spherical in shape as they are acted upon by a hæmolysin produced possibly by the spleen. The older view is strongly supported by the experiments of Dacie and Mollison.³ These workers found that the survival of normal blood transfused into 6 patients with familial acholuric jaundice was normal in 5 cases and only slightly diminished in the sixth case. On the other hand, blood taken from a patient with acholuric jaundice both before and after splenectomy survived for only a short time when transfused into a normal recipient. It is difficult to reconcile these findings with the opinion of Dameshek and Schwartz mentioned above.

REFERENCES.—¹*Edinb. med. J.* 1943, **50**, 589; ²*Medicine*, 1940, **19**, 231; ³*Lancet*, 1943, **1**, 550.

ANÆMIA, HYPOCHROMIC, FOLLOWING PARTIAL GASTRECTOMY.

Stanley Davidson, M.D., F.R.C.P.

H. W. Fullerton, M.D., M.R.C.P.

It is now accepted that hypochromic anæmia is fairly common, while macrocytic hyperchromic anæmia is distinctly rare, after resection of the stomach for

gastro-duodenal ulcer. G. Hemmeler¹ concludes from investigations into the pathogenesis of this form of iron-deficiency anæmia that the important factors are achylia, which occurs in 80 to 95 per cent of the cases reported by various authors, and too rapid passage of food through the alimentary canal. He believes that the fact that food does not pass through the duodenum, which is considered to be the usual site of iron absorption, is of no importance in the pathogenesis because ionized iron can be absorbed below the duodenum. Whether or not these findings give a true picture of the causes of the iron-deficiency, it is clear that blood examinations should be made at intervals in all patients in whom gastric resection has been performed, so that iron therapy can be started before the anæmia has become severe.

REFERENCE.—¹*Schweiz. med. Wschr.* 1942, 72, 670.

ANÆMIA, PERNICIOUS.

Stanley Davidson, M.D., F.R.C.P.

H. W. Fullerton, M.D., M.R.C.P.

Maintenance Treatment.—Experience has shown clearly that patients with pernicious anemia may be maintained in complete remission by intramuscular injections of liver extract given in suitable amounts and at suitable intervals. But it is not an easy matter to define the criteria by which the adequacy of maintenance treatment should be judged. Is one to depend on the red-cell count, the absence of glossitis and gastro-intestinal symptoms, or the patient's sense of well-being? Probably the best indication of complete remission is the absence of macrocytosis as determined by a Price-Jones curve, but this is far too tedious a method for general use. Another difficulty is that the amount of liver extract required for maintenance purposes varies widely in different cases; one patient may need two or three times as much as another. Unfortunately the accurate determination of the necessary maintenance dose requires careful study over a long period and is not practicable when many patients are being dealt with. It would be adequate, therefore, to know the dosage necessary for a large percentage of pernicious anæmia patients and to adopt this as a routine. Bigger doses could then be used in the rare patient who needs them.

These questions are admirably discussed in a recent paper by M. B. Strauss and his colleagues¹ based on the maintenance treatment of 80 patients with pernicious anæmia over long periods. They have adopted the following procedure for determining adequacy of treatment:—

“If the red-cell count is persistently under 4,000,000, greatly augmented doses of liver extract are employed at short intervals—such as 30 to 75 U.S.P. units weekly for two or three months: if this results in consistently higher blood values one concludes that the previous therapy was inadequate.

“If glossitis occurs, the treatment is considered inadequate irrespective of high red-cell levels.

“If neural lesions progress unfavourably the treatment is considered inadequate irrespective of red-cell counts.

“If the patient lacks what he considers a satisfactory sense of well-being on any given amount of treatment and regains a feeling of better health when, unknown to him, he is receiving a larger amount of extract, the original treatment is regarded as inadequate.”

The author makes two other points of importance. First the interval between injections should never exceed one month, and second, concentrated liver extracts are as effective in controlling the neural lesions as the cruder preparations. [The reviewers are in agreement with both these statements.]

It is worth noting that the treatment of pernicious anæmia in America has been considerably simplified by the standardization of liver extracts in terms of U.S.P. units. By this procedure a doctor is not only assured that the liver

extract he uses is potent, but its content of units per c.c. tells him how potent it is. Thus Strasus and his colleagues have adopted a uniform maintenance dose of 15 U.S.P. units of purified liver extract every four weeks for all clinic patients. A doctor using a particular liver extract can easily conform to this recommendation when its strength in U.S.P. units is known. In this country liver extracts are not standardized in this way. As a result doctors are frequently in doubt as to the dosage to be adopted with a particular preparation. There is no reason why this country should lag behind the United States in this respect. Standardization would require co-operation between the manufacturing firms and hæmatologists, and it would also require co-operation on the part of general practitioners who should refer patients with pernicious anæmia in the relapse stage to hospitals where the potency of liver extracts is studied.

Sensitivity to Intramuscular Liver Extract.—Those who treat large numbers of patients with pernicious anæmia are familiar with the symptoms of intolerance to liver extract injected intramuscularly which occur occasionally. To the general practitioner such symptoms are apt to be disconcerting and he is often puzzled as to how best to deal with the situation. The common types of reaction are generalized urticaria, typical asthmatic attacks, and rapidly developing unconsciousness. The last type of reaction is particularly alarming. A hypodermic injection of adrenaline (¶ v–vii) is the most effective immediate treatment.

It is difficult to lay down rules for the management of such cases because their reaction to subsequent injections is unpredictable. Not infrequently the 'allergic' state appears to be transitory, so that the maintenance treatment of the patient can be continued without change and without further reactions. In other cases reactions persist even when smaller doses are injected. There is no point in changing the type of liver extract used; the reactions appear to depend on the development of sensitivity to protein substances in beef liver which are present in all liver extracts.

The problems involved in the management of such cases are discussed by E. Delikat.² In two of the three cases described by her it was possible to achieve desensitization by the use of very small doses which were gradually increased over a period of several weeks until the full requirements were tolerated in one injection at monthly intervals. In the other case it was found possible to give 4 c.c. of liver extract every six weeks in small divided doses spread over a period of two days. [The reviewers have found the method of desensitization to be successful in some cases, but although it is possible to increase the dose gradually until 4 or 5 c.c. are given without untoward effects, a reaction has sometimes followed the next injection given four weeks later. As an alternative to these methods persistently sensitive patients may be treated orally with hog's stomach preparations.]

REFERENCES.—¹*New Engl. J. Med.* 1942, 226, 1013; ²*Brit. med. J.* 1943, 1, 539.

ANÆMIA, PERNICIOUS, OF PREGNANCY AND THE PUERPERIUM.

Stanley Davidson, M.D., F.R.C.P.

II. W. Fullerton, M.D., M.R.C.P.

Treatment.—In last year's MEDICAL ANNUAL a short review was given of recent work on this subject. At that time reference was made to the work of L. S. P. Davidson, L. T. Davis, and J. Innes,¹ who stressed the fact that this type of anæmia might prove refractory to massive injections of liver extract for periods of weeks or even months. They recommended that the blood-count should be maintained at a safe level by repeated blood transfusions until intensive therapy produced a satisfactory remission. The importance of these observations lies in the fact that this temporarily refractory phase has not hitherto been adequately stressed, and ignorance of its occasional occurrence might easily

lead to cessation of treatment after several injections of liver extract had failed to induce a remission. A recent article by H. W. Fullerton² shows that a satisfactory response may follow in at least some of these refractory cases when parenteral liver extract therapy is supplemented by whole liver given by mouth. He describes 3 patients with megaloblastic anæmia of pregnancy and the puerperium in whom liver extract injected intramuscularly was followed by a reticulocyte response but no increase in the blood-count. Rapid blood regeneration occurred when this treatment was supplemented by whole liver in a dose of $\frac{1}{2}$ to $\frac{1}{4}$ lb. daily. These findings suggest that in these cases there was a deficiency of some factor or factors present in whole liver and distinct from the co-existing deficiency of the anti-anæmic factor.

REFERENCES.—¹*Brit. med. J.* 1942, 2, 31; ²*Ibid.* 1943, 1, 158.

ANÆMIA, REFRACTORY.

Stanley Davidson, M.D., F.R.C.P.

H. W. Fullerton, M.D., M.R.C.P.

L. S. P. Davidson, L. J. Davis, and J. Innes^{1, 2, 3} have described 22 cases of this type of anæmia. The first group comprised 16 patients in whom the sternal marrow was hypocellular and normoblastic in type. In 4, the anæmia was secondary to exposure to toxic substances, namely, benzol, trinitrotoluene, neo-arsphenamine, and gold salts, and of these, 2 were fatal and 2 recovered. The remaining 12 cases of this group were idiopathic in origin, and in 9 the anæmia was progressive, and in spite of intensive treatment with liver extract, iron, vitamins, and blood transfusions, proved fatal within a few months. The other 3 have survived for periods exceeding two years.

The second group consisted of 6 cases of severe macrocytic anæmia with hypercellular megaloblastic sternal marrows. They differed from classical pernicious anæmia in several respects, the most important of which was the occurrence of a period varying from four to ten weeks during which intensive treatment with parenteral liver extracts of proved potency failed to induce a remission. None of the factors such as sepsis which are known to inhibit response to treatment in Addisonian pernicious anæmia was present in this series. In view of the eventual recovery of all the 6 cases the authors stress the importance of maintaining life by blood transfusions until the refractory phase has passed.

The striking difference in prognosis between the two groups makes accurate diagnosis a matter of considerable importance. This must depend mainly on careful studies of the bone-marrow.

REFERENCES.—¹*Edinb. med. J.* 1943, 50, 22; ²*Ibid.* 355; ³*Ibid.* 431.

ANÆMIA IN SCURVY.

Stanley Davidson, M.D., F.R.C.P.

H. W. Fullerton, M.D., M.R.C.P.

M. C. G. Israels¹ has reported his studies of 3 cases of scurvy with particular reference to the state of the bone-marrow before and after treatment with ascorbic acid which in each case produced satisfactory blood regeneration without additional anti-anæmic therapy. In 2 patients the sternal marrow showed diminished erythropoiesis before treatment; in the third it was not significantly abnormal. There was an increase in erythropoiesis in all the patients after treatment with ascorbic acid. On the basis of these findings the author suggests that the effect of ascorbic acid deficiency is a depression of erythropoiesis rather than a failure of maturation at any particular stage. He points out that present-day diets are deficient in ascorbic acid especially in winter, and suggests that this may be a factor in the increased incidence of anæmia reported by several authors since the war began. He believes that ascorbic acid should be given to any patient whose anæmia does not respond satisfactorily to iron. These observations supplement those of S. C. Dyke, B. L. Della Vida, and E. Delikat² which

were referred to in the MEDICAL ANNUAL of 1943. These authors found that cases of pernicious anæmia might not respond satisfactorily to parenteral liver extract therapy until ascorbic acid was given, and that subnormal blood levels during maintenance therapy might be due to deficiency of this substance especially during the spring.

REFERENCES.—¹*Lancet*, 1943, 1, 170; ²*Ibid.* 1942, 2, 278.

ANÆMIA, SICKLE-CELL.

Sir Philip Manson-Bahr, C.M.G., D.S.O., M.D., F.R.C.P.

Sickle-cell anæmia has hitherto been regarded as a peculiar characteristic of tropical races in the tropics or, in more temperate countries, confined to the negro section of the population. Now M. A. Ogden¹ has described the sickling trait in 4 of a family of Spanish descent and 5 in a family of German descent. The hereditary transmission has been established with certainty. In the first instance the mother had transmitted the sicklæmic trait to all three children. In the second all four children, one in an active form, had inherited the mother's trait. At the same time the three sons had inherited their father's blood group (A). In the German family, however, a negro ancestry was proved, and the author of this paper believes that in all white persons with sickling trait an admixture of negro blood had occurred in remote ancestry. Thus in investigating this condition in New Orleans, amongst 692 negroes, there were 5 males and 2 females with active sickle-cell anæmia, and 3 males and 35 females with sicklæmia, its total incidence being 6.5 per cent; but there was not a single case of sickling trait in 910 white persons examined.

REFERENCE.—¹*Arch. intern. Med.* 1943, 71, 164.

ANÆMIAS, DEFICIENCY, OF MALNUTRITION.

Stanley Davidson, M.D., F.R.C.P.

H. W. Fullerton, M.D., M.R.C.P.

Several investigations have been made recently into the hæmoglobin levels of sections of the population drawn from different age-groups and of varying economic status. The main object of this work has been to discover what effect, if any, the stringencies of the present war have had upon the incidence of anæmia of nutritional iron-deficiency type. It is a well-established fact that when deficiency of one food factor can be shown to be present other deficiencies are very likely to co-exist although they may not manifest themselves clinically. Therefore the incidence of nutritional iron-deficiency anæmia may be taken as a rough index of the general state of nutrition.

The results of a large-scale investigation of this type carried out in Edinburgh were published recently by L. S. P. Davidson and his colleagues.^{1, 2} The first part of the work deals with the hæmoglobin levels of infants and children of pre-school and school age. A careful comparison is made with the results found in similar work done in Aberdeen in 1935. The main conclusions are that, while anæmia in infancy is still very frequent, it is slightly less common in Edinburgh than it was in Aberdeen, but 39 per cent of Edinburgh school children showed hæmoglobin levels of less than 80 per cent as compared with none in the Aberdeen series of 1935. The Edinburgh figures are similar to those of Helen Mackay,³ who found that 42 per cent of London school children had hæmoglobin levels less than 80 per cent in 1942.

The incidence of anæmia in adolescent and adult males in Edinburgh (1942) was not found to differ significantly from that found in Aberdeen in 1935, and no significant change was observed in the hæmoglobin levels of adolescent and adult females in the two series. The Edinburgh figures for pregnant women were slightly lower than those found in Aberdeen in 1935. Thus the most

striking difference between the two series is the high incidence of anæmia among school children in Edinburgh as compared with its absence in Aberdeen in pre-war days. The authors form no conclusions regarding the aetiology of the anæmia in the various groups, since they are continuing investigations into this aspect of the problem.

H. C. Trowell⁴ has described the features of the deficiency anæmias of malnutrition as they occur in Uganda. He suggests that the term "dimorphic anæmia" is a suitable one because there is often deficiency of iron as well as of extrinsic factor in the diet. The colour index varies. It is low when iron-deficiency is marked and high when it is slight. Macrocytosis of some degree is always present. The anæmia responds to marmite in large doses but the author prefers to use whole liver or injections of liver extract. He has found that both crude and concentrated extracts are effective, but the dosage necessary is considerably greater than in pernicious anæmia. Iron, of course, should be given in addition if hypochromia is present.

REFERENCES.—¹*Brit. med. J.* 1942, 2, 505; ²*Ibid.* 1943, 2, 95; ³*Lancet*, 1942, 2, 32; ⁴*Ibid.* 1943, 1, 43.

ANÆSTHESIA AND ANALGESIA. (See also NASAL INTUBATION.)

C. Langton Hewer, M.B., B.S., D.A.

INHALATION ANÆSTHESIA

The 'circle' type of closed-circuit apparatus has so many advantages that its use is becoming almost universal. A new carbon-dioxide absorber has been designed by W. W. Mushin¹ to avoid leakage and to facilitate controlled respiration. It is constructed from a single casting and is fitted with a concertina-shaped re-breathing bag which is connected by a lever to a knob facing forwards (*Fig. 1*). This affords visual indication of the rate and depth of respiration and enables the bag to be compressed at will. Careful design has minimized resistance to respiration which was a fault of some early circle machines. The resistance with the absorber in circuit and with the ether vaporizer fully on is only from 2 to 4 mm. H₂O.² An unusual feature of this apparatus is that the respired gases pass twice through the absorber per respiration and once through the ether vaporizer, thus reversing the usual practice. It is claimed that more efficient absorption of carbon dioxide results.

ENDOTRACHEAL ANÆSTHESIA

R. R. Macintosh³ maintains that direct vision laryngoscopy can be performed under a lighter plane of narcosis if the tip of the laryngoscope blade is only passed as far as the angle made by the epiglottis with the base of the tongue. If the laryngoscope is now lifted, the base of the tongue with the attached epiglottis will be forced upwards, bringing the glottis into view. A short curved laryngoscope blade has been devised to facilitate this procedure.

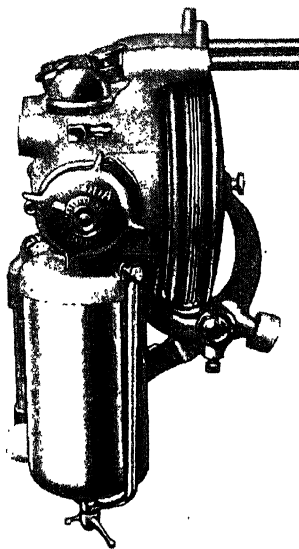


Fig. 1.—Side view of Mushin's absorber showing concertina-shaped re-breathing bag and pivoted lever terminating in a knob.

INTRAVENOUS ANÆSTHESIA

Intermittent Dosage with Coloured Pentothal.—It is generally agreed that the method of adding strong pentothal sodium solution intermittently to a continuous drip-saline is preferable to that of giving a dilute solution continuously both as regards control and economy. R. L. Soper⁴ has modified the fractional method by colouring the pentothal with indigo-carmin and instead of inserting the needle of the syringe directly into the rubber tube of the drip, he connects it via very fine tubing (*e*) which runs inside wider-bore tubing and a glass Y-piece to end half-way down the glass tube (*x*) attached to the intravenous needle (*Fig. 2*). This gives very fine control and the anæsthetic solution can actually be seen mixing with the saline.

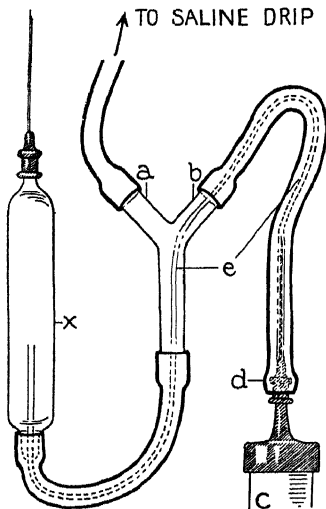


Fig. 2.—Connections for giving coloured pentothal solution intermittently into a continuous saline drip. (After R. L. Soper.) (By kind permission of 'The Lancet'.)



Fig. 3.—Self-administered general analgesia with nasal ethyl chloride. (After S. A. Forman.) (Reproduced from 'Anæsthesia and Analgesia'.)

Allergy to Barbiturates.—A. R. Hunter⁵ records a case which appears to show that, at any rate with pentothal sodium, a true cutaneous allergy can occur. To disregard a history of previous trouble after administration of this drug may lead to the patient becoming quite ill with pyrexia, an erythematous vesication, and even a generalized pustular eruption.

GENERAL ANALGESIA

Much interest has been taken in general analgesia during the past year and trichlorethylene has been the drug most commonly used.

J. D. Rochford and B. T. Broadbent⁶ describe a very simple method of producing analgesia for short dental cases with *ethyl chloride*. The lips are smeared with vaseline, a dental prop is inserted, and a 2 by 6 in. oblong of gauze is crumpled up and placed between the teeth. The patient is told to breathe through his mouth and about 6 c.c. of ethyl chloride are sprayed on to the gauze at intervals for about 45 seconds. The gauze is then pushed aside and the operation carried out. Analgesia lasts from 1 to 2 minutes and after-effects are rare.

For longer dental procedures such as painful drilling, nasal administration is advisable.

S. A. Forman⁷ has devised a nose-fitting which is strapped to the forehead and enables the patient to inhale a weak ethyl chloride vapour when he squeezes a rubber hand-bulb (*Fig. 3*). If time proves the device efficient, this method of self-administered analgesia should be extremely useful in many circumstances.

LOCAL ANALGESIA

Pressure Infiltrator.—If large areas must be infiltrated, a good deal of time and energy is wasted by using syringes even if these are of the continuous-flow pattern. Matas invented a pressure infiltrator 40 years ago, and Continental anaesthetists have used various patterns from time to time since then. N. R. James⁸ describes a sturdy and durable outfit (*Fig. 4*) modified from a commercial spray-gun. Pressure is obtained from a motor tyre pump and a trap

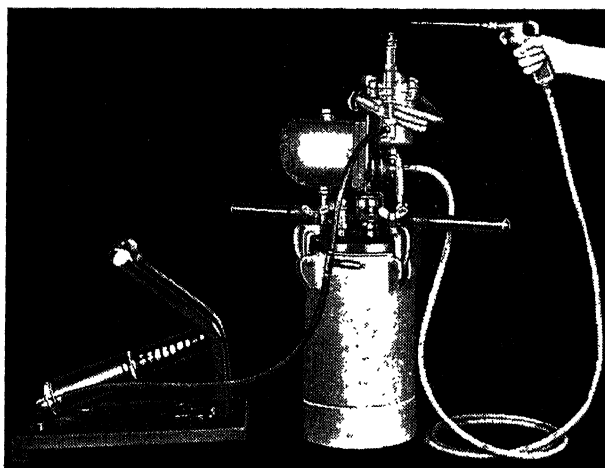


Fig. 4.—Dr. N. R. James's pressure infiltrator. (*By kind permission of 'The Lancet'.*)

ensures that no air can under any circumstances be injected through the needle, which fits on to a pistol-grip control. A special fitting allows the aspiration test to be performed. Sterilization can be effected by blowing steam through the entire apparatus.

Fractional Caudal Block.—During the past year, considerable publicity has been given to the method of prolonging caudal block by repeated doses of the analgesic drug. The technique can be used for a variety of prolonged operative procedures, but was primarily developed for producing analgesia in labour. The original method of R. A. Hingson and W. B. Edwards⁹ was to leave a malleable needle in the caudal canal and to inject a 1.5 per cent solution of *metycaine* from a continuous-flow syringe. An initial dose of 30 c.c. was given and about 20 c.c. every 30 to 40 minutes subsequently. Gluck and Rochberg¹⁰ have modified this technique by using a continuous drip of 1 per cent *procaine*.

The chief complication of the method appears to be broken needles, but cases of collapse and of prolonged backache afterwards have also been reported. In order to obviate the bugbear of broken needles, C. Adams¹¹ and others have

modified the technique by inserting a large (13 gauge) needle into the caudal canal with a ureteric catheter inside it (*Fig. 5*). The needle is then withdrawn and the analgesic solution is run in through the catheter.

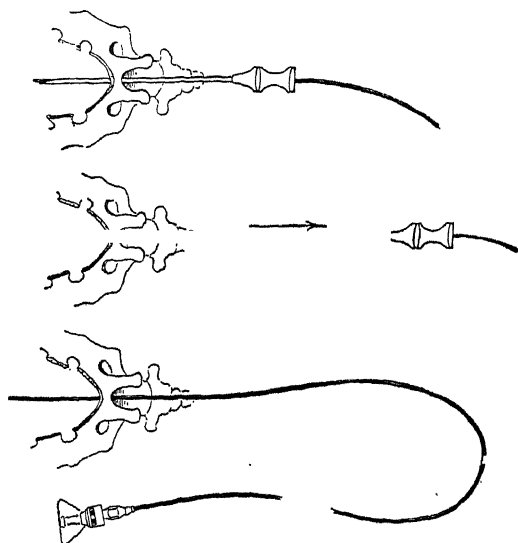


Fig. 5.—*a*, Needle inserted into caudal canal with tip of ureteric catheter flush with needle bevel; *b*, Needle being withdrawn over catheter; *c*, Catheter in position.

(Reproduced from the *Journal of the American Medical Association*.)

ANALEPTICS

The number of analeptic drugs now on the market is legion. It must be confessed that the choice of agents is apt to depend less on their known effects than on the intensity of advertising propaganda attained by their respective manu-

facturers. Recently, however, a preparation has been introduced which does appear to have real merit. *Methedrine* (pervitin) is N-methylamphetamine

with the structure $\text{CH}_2\text{CH}(\text{NHCH}_3)\text{CH}_3$. Its effects have been described

in a paper by H. Dodd and F. Prescott.¹² The drug appears to act mainly on the heart and blood-vessels like ephedrine, pholedrine, phedracine, and neosynephrin rather than on the medullary centres like nikethamide and leptazol. The intramuscular adult dose is from 15 to 30 mg., but if an immediate effect is required 15 mg. can be given intravenously as well as 15 mg. intramuscularly. The subsequent rise in blood-pressure is said to be well maintained for an exceptionally long time without untoward side-effects.

ANÆSTHETIC CHARTS AND RECORDS

Various charts for recording blood-pressures, pulse-rates, etc., during prolonged operations are in existence, but they suffer from lack of uniformity. Anæsthetic records are usually extremely scanty or non-existent. It is obvious that if uniform charts and records were accurately filled in by the majority of practising anæsthetists, an enormous amount of comparable statistics would be available from which valuable deductions could be made. In America an attempt was made to combine charts and records by means of a "Hollerith" punch card.¹³ The idea met with some success in spite of the fact that an arbitrary code had to be used and an expensive mechanical sorting device employed. In Great Britain M. Nosworthy¹⁴ has devised a most ingenious chart and record card, the two sides of which are illustrated (*Figs. 6, 7*). It will be seen that holes are punched round the four sides of the card and the "positive factors" corresponding to the holes are ringed round by the anæsthetist at the time of the operation. At any subsequent date the ringed holes are

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Fig. 6.—Anaesthetic record. Front of card. (Figs. 6, 7 reproduced from the 'British Journal of Anaesthesia'.)

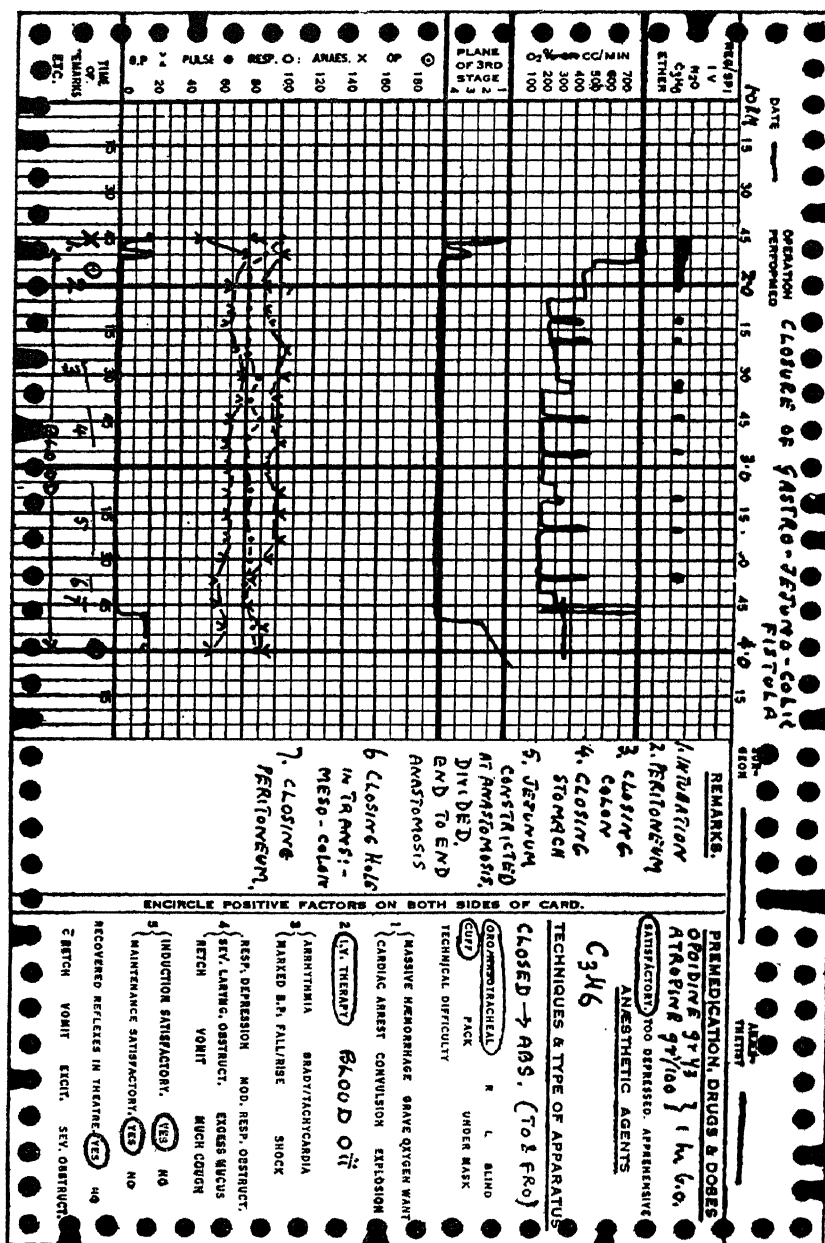


Fig. 7.—Anæsthetic record. Back of card.

converted into U-shaped slots by two cuts with scissors or by a clipper. When completed, the corner indicated is cut away and the cards can then readily be filed in their correct order. If any investigation is conducted later, all the cards incorporating any particular "positive factor" can be obtained by simply threading a knitting needle through the appropriate hole and lifting out the cards which have not been clipped. The desired cards will then remain behind. Any further sorting can then be carried out.

These cards are now being tried out in a large number of Service and E.M.S. hospitals in this country and should prove to be a notable advance in anaesthesia.

REFERENCES.—¹*Brit. J. Anaesth.* 1943, Jan., 97; ²*Brit. med. J.* 1943, 1, 130; ³*Lancet*, 1943, 1, 205; ⁴*Ibid.* 235; ⁵*Ibid.* 46; ⁶*Brit. med. J.* 1943, 1, 664; ⁷*Anaesth. and Analges.* 1942, Nov.-Dec., 318; ⁸*Lancet*, 1943, 1, 738; ⁹*Anaesth. and Analges.* 1942, Nov.-Dec. 301; ¹⁰*Amer. J. Obstet. Gynec.* 1943, 45, 645; ¹¹*J. Amer. med. Ass.* 1943, May 15, 152; ¹²*Brit. med. J.* 1943, 1, 345; ¹³*Anesthesiology*, 1941, March, 179; ¹⁴*Proc. R. Soc. Med.* (Anaesth. Sec.), 1943, May, and *Brit. J. Anaesth.* 1943, 18, No. 4.

ANAL ANATOMY: THE PERIANAL SPACE. W. B. Gabriel, M.S., F.R.C.S.

E. T. C. Milligan¹ has described the anatomical boundaries and surgical significance of this space which is situated at the termination of the anal canal

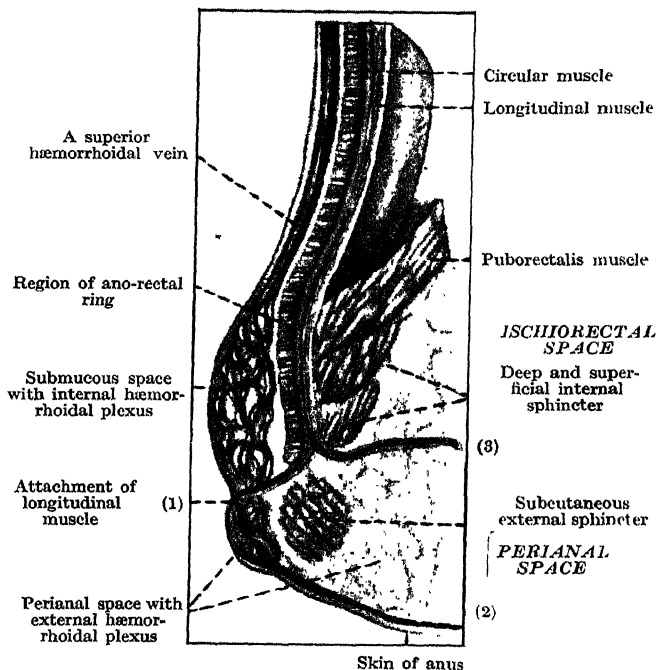


Fig. 8.—Showing the terminations of the longitudinal muscle (in red). (1) Intermuscular septum; (2) Corrugator cutis ani muscle; (3) Septum of the ischioanal fossa. Recto-urethralis not shown.

(By kind permission of the 'Proceedings of the Royal Society of Medicine'.)

(Fig. 8). The perianal space is bounded above by two fibrous septa derived from the longitudinal muscle of the rectum: (1) the intermuscular septum which passes inwards between the lower border of the internal sphincter and the subcutaneous external sphincter and is attached to the anal canal at the

mucuo-cutaneous junction; and (2) a septum which extends outwards across the ischio-rectal fossa and separates the perianal space from the ischio-rectal space. On its inner and lower aspects the perianal space is bounded by the skin of the anal canal and anus together with the underlying corrugator cutis ani muscle which is also considered to be a termination of the longitudinal muscle. Laterally the perianal space is open and has no definite boundary.

The principal contents of the space are: (1) The subcutaneous external sphincter ani; (2) The external hæmorrhoidal venous plexus; (3) The inferior hæmorrhoidal nerves; (4) Fat, which fades out laterally and becomes continuous with the superficial fascia of the buttocks. The space is important in regard to the development of perianal hæmatomas and abscesses, subcutaneous and low-level fistulæ, and anal fissures; their correct treatment involves a clear knowledge of the anatomy of the perianal space.

REFERENCE.—*1*Proc. R. Soc. Med. 1943, 36, 365.

ANAL GLANDS.

W. B. Gabriel, M.S., F.R.C.S.

M. R. Hill, E. H. Shryock, and F. G. Rebell¹ have conducted a histological study of the anal 'intramuscular' glands, the material being obtained from 17 subjects, 11 of whom were adults. Deep penetration of an anal gland into the internal sphincter was clearly demonstrated, also the occurrence of ramifying anal glands extending up from an anal crypt beyond the mucuo-cutaneous junction into the submucosa of the rectum. In one adult case a cyst lined with flattened epithelium containing mucin was found, and the authors consider that infection of such a cyst would explain the origin of those abscesses and fistulæ which do not communicate with the anal canal. A cyst of this type is also of extreme interest in relation to the development of carcinoma (see the case of primary adenocarcinoma of an anal gland described by R. Scarborough²). The authors of this paper believe that the anal glands in adults are by no means vestigial structures, for in 3 cases evidence of function in the glands was given by special staining methods. The paper is illustrated with some excellent photomicrographs.

REFERENCES.—*1*J. Amer. med. Ass. 1943, 121, 742; *2*Trans. Amer. proctol. Soc. 1941, 42, 172.

ANAL INCONTINENCE.

W. B. Gabriel, M.S., F.R.C.S.

Paul C. Blaisdell¹ discusses the problem of injury to the anal sphincter when a large segment of the sphincter has been destroyed. Hitherto these cases have been subjected to attempts at dissecting out and suturing together the ends of the remaining portion of the sphincter: this method invariably proved unsuccessful, and then the only remaining hope was by transplantation of muscle, for instance from the glutei.

The following operation *in two stages* is described:—

1. Two flaps of skin and underlying tissues bearing the ends of the divided anal sphincter are dissected out and resutured farther round the anal circumference, with the assistance of buried and stay sutures of steel alloy wire. A purse-string suture is placed round the anus to relieve tension.

2. At the second stage an incision is made across the remainder of the gap, parallel to the anal margin, and is carried to the greatest depth of the sphincter muscle. The wound is then sutured transversely with steel sutures as before: this manœuvre still further approximates the ends of the sphincter and at the same time closes the anus.

A case-report with photographs and diagrams illustrating the steps is given, and a reference is made to a previous paper by K. E. Smiley² on the advantages of steel alloy sutures in plastic operations in the anal region.

REFERENCES.—*1*Surg. Gynec. Obstet. 1942, 75, 634; *2*Trans. Amer. proctol. Soc. 1940, 41, 191.

ANORECTAL WOUNDS.*W. B. Gabriel, M.S., F.R.C.S.*

C. A. V. Burt and E. J. Pulaski¹ recommend a sterile zinc peroxide cream as the primary dressing to anorectal wounds, whether after minor operations such as those for cure of fissures and fistulæ, or after excision of the rectum. The sterilized zinc peroxide powder is made up at the time required, with sterile distilled water or normal saline, into a heavy cream; the gauze for dressing the wound is soaked in this suspension and is inserted into the anal canal in the usual way; the entire raw surface is covered. Vaseline gauze is placed over the packing, then plain gauze and strapping to exert some pressure. The packing is usually removed at the end of 24 hours, but may be left for four or five days until granulations have formed.

After excision of the rectum a large abdominal pack soaked in the zinc peroxide cream is so placed as to line the depths of the wound beneath the new pelvic floor; the space within the pack is filled loosely with plain or iodoform gauze which is partially removed on the first and second post-operative day. The zinc peroxide pack is removed by the fifth day; it can be removed without pain or oozing, because it does not adhere to the raw surfaces. A greyish white surface remains for three or four days and when this clears up healthy granulations appear and the authors consider that healing proceeds more rapidly than with other types of packing.

One advantage is that a zinc peroxide packing may be kept in place for days without producing a bad odour; also it is hæmostatic, and in the case of anal wounds false union of the raw surfaces is prevented by the deposit of solid particles of zinc peroxide.

REFERENCE.—¹*Surg. Gynec. Obstet.* 1942, 75, 765.

ANURIA.*Hamilton Bailey, F.R.C.S.*

Sulphonamide Anuria has now become a positive menace. There are three effective measures of preventing it:—

1. During sulphonamide therapy the fluid intake must not be less than five pints in 24 hours.
2. The urine must be rendered alkaline during this form of therapy.
3. The prescribing of sulphonamides on chance must cease (A. L. Kerr¹).

Orientalers appear to be much more susceptible to sulphonamide crystalluria than the white races; the Japanese incredibly so. R. W. Barnes and G. K. Kawaichi² report that of 40 Japanese patients in the Los Angeles hospital undergoing routine sulphonamide therapy for varying conditions, no less than 15 per cent developed anuria from sulphapyridine and during the same period 7.9 per cent of 38 patients developed anuria from sulphathiazole. W. Thompson³ reports a case where on cystoscopy both ureteric orifices were seen to be blocked by brown spiky crystalline masses. Only after repeated washings of the bladder was it possible to insert one ureteric catheter. This patient recovered. A. L. Kerr,¹ in a similar instance, found that catheterization of the ureters was difficult owing to their being filled with obstructing material, but he was able to insinuate a catheter on one side, with an immediate flow of urine from that kidney. C. P. Mathé⁴ records a case of anuria which developed seven days after the administration of 15 g. of sulphadiazine, relieved by ureteric catheterization.

W. A. Flynn⁵ confirms Laird's observation that when ureteric catheterization is found to be impossible, massage over the kidneys may invoke a flow of sludge-like urine. Flynn reports a successful issue resulting from massage per rectum of the ureters in their course through the bladder wall—the commonest site of obstruction—followed by external massage over the kidneys and upper ends of the ureters. This treatment is only of value if carried out early. Elevation of temperature helps to dissolve sulphonamide concretions. Applications of

heat to the loins and to the lower abdomen is, therefore, rational (R. W. Barnes and G. K. Kawaichi²). J. M. Rogan and E. K. Cruikshank⁶ give details of a case of sulphapyridine anuria treated successfully by the application of short-wave diathermy to each renal area alternately.

The important subject of the treatment of sulphonamide anuria has been summarized as follows⁷: All patients taking full doses of sulphonamide must have an intake of at least five pints of fluid in the 24 hours. Anuria of 12 hours' duration is the indication for cystoscopy with ureteric catheterization and lavage of the renal pelves. In infants and others where this proves impossible, unilateral nephrostomy is indicated.⁸

(See also CHEMOTHERAPY OF BACTERIAL INVASION—TOXIC EFFECTS INVOLVING THE URINARY SYSTEM.)

Anuria in General.—It is essential to treat every case according to a plan based on reasoned diagnosis. In this connection the following classification is immensely helpful:—

1. *Obstructive* (syn. *post-renal*) *anuria*: necessarily this must be bilateral, or involve a sole functioning kidney.

2. *Renal anuria* consequent upon failure of renal epithelium to function.

3. *Pre-renal anuria* due to a fall in the blood-pressure below the point where excretion of urine is possible (H. Bailey⁹).

Regarding the last, H. E. Kasten¹⁰ says that if the arterial blood-pressure falls below 70 to 90 mm. of mercury, renal excretion will cease.

In cases of renal anuria where the cause is undeterminable and disappointment follows energetic treatment, the strange phenomenon of hypochloræmic uræmia should be borne in mind. Hypochloræmic uræmia was first described by Blum in 1928. His explanation was that urea is used by the body to maintain osmotic equilibrium in the absence of chlorides. Therefore, in cases of unexplained anuria a blood-chloride estimation should be performed, and if this is low it is vital to supplement chlorides, which otherwise are contra-indicated.

S. Galewski¹¹ describes a case of hypochloræmic anuria following an operation of implantation of the ureter into the bowel; the patient passed very little urine for five days. Galewski found that the chlorides were 250 mg. as NaCl per 100 c.c. He therefore discontinued giving intravenous glucose and substituted isotonic saline. Ten hours later the patient's condition was appreciably better, and he thenceforth gave rise to no anxiety.

G. Carroll¹² says that after any operation the blood chlorides are reduced and nitrogen retention almost always follows. Traumatized tissue shows a rise in chloride content. Hypochloræmia is not in itself a cause of renal insufficiency, but a consequence of trauma to tissue. The administration of 3½ pints of normal saline will provide 25 g. of sodium chloride, which is obviously in excess.

¹Lancet, 1943, 1, 646; ²J. Urol. 1943, 49, 324; ³Lancet, 1943, 1, 647; ⁴Urol. cutan. Rev. 1943, 47, 168; ⁵Lancet, 1943, 1, 648; ⁶Brit. med. J. 1942, 1, 757; ⁷Annotation, Lancet, 1943, 1, 651; ⁸Ibid. 74; ⁹Emergency Surgery, 5th ed., 1944, Bristol; ¹⁰J. Urol. 1943, 49, 93; ¹¹Brit. J. Urol. 1943, 15, 17; ¹²Med. Clin. N. Amer. 1942, 26, 343.

APPENDICITIS.

A. Rendle Short, M.D., F.R.C.S.

Appendicitis in Middle and Advanced Life.—J. H. Powers,¹ of Cooperstown, New York, writes on the incidence of appendicitis in a rural community. He points out, as others have done, that it is a more serious disease in the second half of life, and the diagnosis is often uncertain at the onset, as the signs may be anomalous. It may be fulminating in character.

Appendicitis Associated with Contagious Disease.—Max Goodman and I. Silverman,² of New York, writing from a fever hospital, quote a considerable number of cases of acute appendicitis. Mumps and measles are the contagious diseases in which appendicitis is most frequently seen. The total incidence

was 0.18 per cent for all fevers. As might be supposed, there is often delay in making the diagnosis, and in more than half the cases perforation has already occurred when they come to operation.

Propaganda to reduce Risks of Appendicitis.—Medical officers of North American Insurance Companies report that the peak mortality from appendicitis was reached between 1929 and 1932. Since then it has fallen from 13.2 per 100,000 in 1933 to 10.3 in 1939. Since 1940 the fall has become steep, down to 5.5 in 1942. The earlier fall is attributed to health propaganda, and the later fall, 1940–1942, to health propaganda plus sulphonamides. Health propaganda took the form of begging the public to send for the doctor early when abdominal pain was complained of, and to avoid cathartics. Leaflets and advertisements, and notices in druggists' shops, were used for this purpose.³

Diagnosis from Gastro-enteritis.—The accompanying diagram (Fig. 9) represents in graphic form the experience of two doctors, T. B. Quigley and

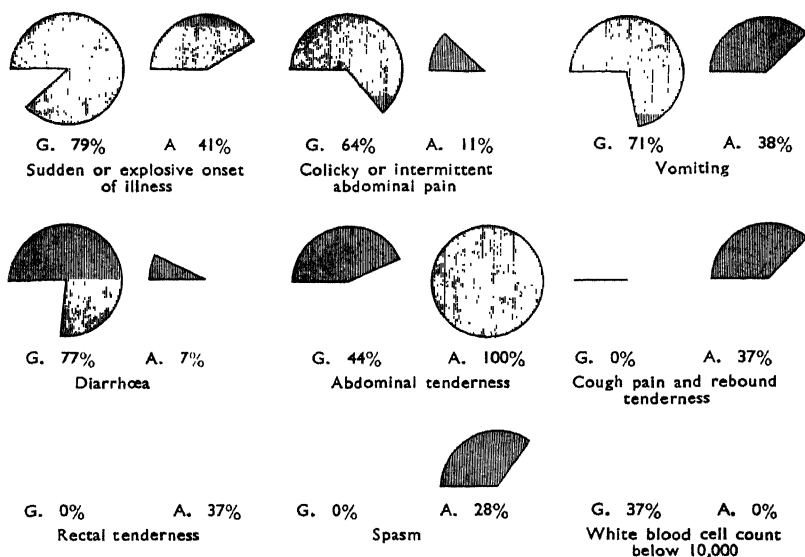


Fig. 9.—Differential diagnosis between gastro-enteritis (G) and appendicitis (A). (Reproduced from the 'New England Journal of Medicine'.)

A. W. Contratto,⁴ in differentiating between acute appendicitis and acute gastro-enteritis in university undergraduates at Cambridge, Massachusetts.

A New Sign in Appendicitis.—R. Capurro,⁵ of Montevideo, maintains that in cases of appendicitis, whether the appendix is normally placed, retrocaecal, or pelvic, tenderness can be elicited by deep pressure on the posterior peritoneum, at a point just internal to, and above, the anterior superior iliac spine (Fig. 10). Four fingers should be used.

The Appendix Mass.—A statistical study of 227 cases of appendicitis with a palpable mass in the right iliac fossa is presented by H. H. Faxon and H. Rogers,⁶ of Boston. The mass is of course evidence of at least a partial localization of the infection. It can rarely be felt under 48 hours from onset. The mortality was 5 per cent, whereas in cases of appendix peritonitis without a palpable mass it was 12 per cent. There were no fatalities in the 76 explorations carried out

as a secondary procedure following incision and drainage; in 73 of these the appendix was removed from four to seven months afterwards. They arrive at the following conclusions :—

Patients with appendiceal peritonitis with mass formation present a very different clinical entity and therapeutic problem from those found in cases of appendiceal peritonitis without mass formation. The treatment in such cases is surgical.

Operations should rarely be done on the fifth, sixth, or seventh day of the disease.

If a policy of deferring operation is adopted, it had best be pursued for at least four days.

The abdomen in all cases of appendiceal peritonitis should be carefully palpated under anaesthesia before operation, and if a mass is discovered at that time, the plan of treatment should be re-evaluated and operation possibly postponed.

If the presence of a laterally situated mass is not appreciated until after the peritoneal cavity has been opened, any medially placed original incision should be closed and drainage instituted through a MacBurney incision.

A MacBurney incision or one of its modifications, rather than some form of rectus approach, should be used for both appendicectomy and simple incision and drainage, unless the mass lies unusually

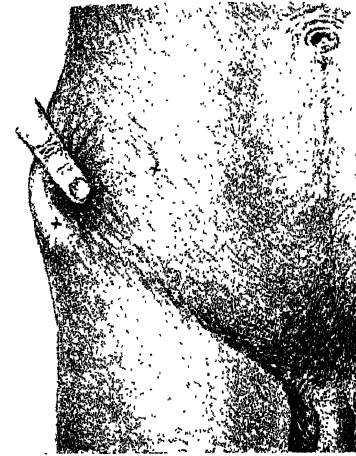


Fig. 10.—Deep palpation of the abdomen about 2 cm. medial and 2 cm. superior to the anterior iliac spine. Objective pain is diagnostic of a lesion of the appendix. Crosses mark the anterior superior spine and MacBurney's point. (Reproduced from the 'Annals of Surgery'.)

far toward the midline, when operation through a pararectus incision, with drainage through a laterally placed stab wound, should be considered.

Incision and drainage alone should be done as a primary procedure unless the technical removal of the appendix can be readily accomplished. Observance of this principle is especially important after the fourth day of the disease.

Appendicectomy should be carried out within six weeks following incision and drainage unless the patient is in generally poor condition or some complication provides an indication for a longer interval between operations.

Even when a localized mass has formed, the general clinical impression that the patient creates at entry of being very ill or not very ill is of more reliable prognostic significance than any laboratory data.

Faecal Fistula following Operation for Appendicitis.—Faecal fistulae after operation for appendicitis usually close within a few weeks, without the necessity for special treatment. P. T. Crymble,⁷ however, discusses 3 cases in which discharge of faeces went on for years. In one of these, prolapse of the ascending colon through the fistula occurred. In two others, all the faeces came through the fistula instead of through the rectum. All were due to technical errors by the original surgeons. In one instance, a rubber drainage tube was left in contact with the bowel for nine days. In the others, inflamed caecum or ileum had been grossly injured. These patients may keep fairly well, but the skin of the abdominal wall becomes very sore. If there is no obstruction, and the leak comes from the caecum not too near the ileocaecal valve, local closure may

succeed. Otherwise, the terminal ileum and the right colon must be removed, preferably by a two-stage operation.

REFERENCES.—¹*Ann. Surg.* 1943, 117, 221; ²*New Engl. J. Med.* 1943, 228, 533; ³*Brit. med. J.* 1943, 1, 277; ⁴*New Engl. J. Med.* 1942, 226, 787; ⁵*Ann. Surg.* 1943, 117, 735; ⁶*New Engl. J. Med.* 1942, 226, 745; ⁷*Brit. med. J.* 1943, 1, 532.

ARRHYTHMIA.

William Evans, M.D., F.R.C.P.

Paroxysmal Auricular Tachycardia.—W. T. Cook and P. D. White¹ collected 750 cases of paroxysmal auricular tachycardia. They found that the likelihood of any particular attack ceasing, in spite of the most alarming symptoms, was practically certain. The death of only 7 patients in the series was due, directly or indirectly, to a paroxysm. When a patient who is seriously ill has an attack the occurrence should be regarded with some apprehension, and heart failure as a result of the attack may lead to the formation of intracardiac thrombi and subsequent emboli. Paroxysmal auricular tachycardia in apparently healthy persons seems to have no effect on the prospect of their longevity; when it occurs late in life its prognosis in general is that of the underlying heart disease. Paroxysmal auricular fibrillation is common; when the patient is under 40 it has little prognostic significance, but in older subjects it may be the first sign of a serious heart disorder. The frequency or the duration of attacks of paroxysmal auricular tachycardia and fibrillation cannot be foretold.

Paroxysmal Ventricular Tachycardia.—The diagnosis of paroxysmal ventricular tachycardia can only be made by electrocardiography, and even by this means it is never made beyond doubt. The essential feature is that the pacemaker has an ectopic ventricular origin causing a prolonged QRS interval. But such ventricular complexes may be produced in auricular or nodal tachycardia especially when the P waves are obscured within the QRS period. C. Williams and L. B. Ellis² have written about 36 patients who, with one exception, had organic disease. Twenty-one died in hospital and the remainder also died within a month of the cessation of the attack. Digitalis intoxication was regarded as associated with the attack in 8 instances and was probably the precipitating factor in 9 more. The writers pointed out that the serious prognosis identified with ventricular tachycardia was essentially the prognosis of the underlying heart disease.

W. T. Cook and P. D. White³ gave four criteria in the cardiographic diagnosis of ventricular tachycardia: (1) The presence of P waves at a lower rate than that of abnormal QRS waves during a paroxysm of tachycardia; (2) A paroxysm of abnormal ventricular complexes, that is, three or more, occurring during auricular fibrillation; (3) The onset of the tachycardia with an abnormal ventricular complex; (4) Close resemblance of the complexes of ventricular premature beats to the complexes occurring during paroxysmal tachycardia. They reported 27 cases. Digitalis had been administered to 13 of the 27 cases before the onset of the tachycardia; it was probably the aetiological factor in at least 5 of the cases. The prognosis was generally but not always poor. Quinidine should be used in adequate dosage for the attack, and they recommend 6 gr. by mouth two-hourly for 6 doses under observation and electrocardiographic control.

Quinidine.—After the administration of a cinchona derivative in man the electrocardiogram shows an increase in the period from the beginning of the Q wave to the end of the T. This index was used by E. L. Sagall, C. D. Horn, and J. E. F. Riseman⁴ to measure the speed and duration of action of quinidine given orally or by intramuscular injection. The effect became evident shortly after taking a single dose by mouth, reached a maximum in a little over two hours, and was maintained for some four hours, after which it decreased and

was gone in 24 hours. Larger doses of quinidine did not change the time of the maximum response although the effect appeared earlier and lasted longer. The response to intramuscular injection of "injectable quinidine" (a solution of quinidine hydrochloride with urea and antipyrin) was much more prompt (within 15 minutes); the maximal effect was only slightly greater and the duration of effect was approximately the same as when an equivalent dose was given by mouth. These results indicate that quinidine should be given two-hourly in order to maintain a continuous action and that the oral effect was as efficient as the intramuscular for practical purposes. Intravenous administration of quinidine was considered unnecessary and unwise.

REFERENCES.—¹*Brit. Heart J.* 1942, 4, 153; ²*Arch. intern. Med.* 1943, 71, 137; ³*Brit. Heart J.* 1943, 5, 33; ⁴*Arch. intern. Med.* 1943, 71, 460.

ARTIFICIAL RESPIRATION. (See RESUSCITATION OF THE APPARENTLY DROWNED.)

ASTHMA.

Maurice Davidson, M.D., F.R.C.P.

A short account of the use of *nicotinic acid* in the treatment of the paroxysms of asthma is contributed by G. Melton,¹ who reports relief obtained in 21 out of 30 cases treated with this drug, either by intravenous injection (16 patients relieved out of 21) or by oral administration (5 relieved out of 9). He notes the occurrence, after injection, of flushing and a feeling of warmth, with occasional giddiness, headache, and various transient vasomotor disturbances, similar to the effects observed after intravenous injection of aminophyllin. When given over long periods he finds that the drug appears to be useful in lessening the frequency and severity of the attacks. The usual dose is 50 mg. in 10 c.c. of sterile water for intravenous injection; double this dose may be used for intramuscular injection. Cases which have already received intravenous doses may subsequently be given the drug orally in doses of 50 or 100 mg. (one or two tablets) during a paroxysm. Tablets of 50 mg. may also be given by mouth twice or thrice daily between attacks for periods varying from a few weeks to several months.

F. W. Gaarde, L. E. Prickman, and H. J. Raskowski² report a study of 189 consecutive cases of allergic asthma and asthmatic bronchitis (101 of the former, 88 of the latter) which underwent *major surgical operations*. Details are given of the various pulmonary post-operative complications experienced. In the entire group 4 deaths occurred (mortality-rate of 2.1 per cent). Considerable care as regards pre-operative medical treatment was exercised in all cases, and idiosyncrasies were noted. Ether anaesthesia was avoided whenever possible. Patients were placed in an oxygen tent on their return from the operating theatre if their asthma appeared to warrant it. The authors found that 86.7 per cent of their patients underwent major operations without developing serious pulmonary complications; they conclude that in the case of patients with asthma and asthmatic bronchitis the risks of operation, with adequate pre-operative and post-operative care, are not unduly great.

REFERENCES.—¹*Brit. med. J.* 1943, 1, 600; ²*J. Amer. med. Ass.* 1942, 120, 431.

ASTHMA IN CHILDHOOD.

Reginald Miller, M.D., F.R.C.P.

Sir A. Hurst¹ defines asthma as the reaction of an over-excitable bronchial system, including the medullary centre, the vagal nerve-endings, and the bronchial musculature and mucosa, to blood-borne irritants and to reflex and psychical stimuli, and sees no reason for altering that definition. The irritable bronchial system, which constitutes the asthma diathesis, is a congenital and often inherited

constitutional abnormality. It results in the vagal constituent of the bronchial nervous system being predominant over its sympathetic partner. In the presence of this diathesis certain allergens and reflex and psychical stimuli, which have no effect on normal individuals, give rise to spasm of the bronchial muscles, often associated with hypersecretion of the bronchial mucous glands, together with congestion of the bronchi, which is the natural accompaniment of their excessive functional activity. Associated with the physical side of the asthma diathesis there is probably a psychological side, which manifests itself in a special type of personality. It is extremely difficult to decide how much of the "asthma personality" is a result of over-protection by too anxious parents.

The constitutional factor in asthma shows remarkable variations at different times. A patient may be almost constantly asthmatic for weeks together and then have a period of complete freedom, when he can expose himself with impunity to all the allergens to which he is usually sensitive, eat big meals just before bedtime, take unlimited exercise, and face psychological difficulties which on other occasions would cause severe attacks. There is no doubt that the more completely attacks are prevented by removing all known exciting causes the less irritable does the bronchial system become. One might be tempted to believe that the cure of asthma is not to have it; but unfortunately this is not true, as even after long periods of freedom the diathesis is still present and the asthma may recur. It is, however, a fact that if a child can be kept completely free from asthma for a couple of years he is quite likely to remain free for the rest of his life.

Biochemical Causes.—Hurst regards it as a mistake to assume that allergy is the one essential factor in the production of asthma. On the one hand hypersensitivity only develops in those who have the asthmatic diathesis, and even then these allergic reactions show strange variations both in type and severity. On the other hand, in many sufferers from asthma allergic factors are absent and the attacks are due to reflex or psychical stimuli. Allergic reactions of real moment are less likely to be detected by skin tests than by a careful cross-examination of the patient.

Reflex Causes.—The respiratory tract is the main reflex source of asthma. When a child with a narrow nasal airway lies down at night the passive congestion of the cavernous tissue of his turbinates may be sufficient to bring them into contact with the irritable mucosa of the septum and thus give rise to reflex bronchial spasm. The narrow airway may be congenital, or the result of an injury or of chronic infection which leads to permanent congestion of the mucous membrane and the development of polypi. Intermittent congestion is also a common reaction to the inhalation of allergens. Suitable treatment, with a minimum of surgery, may prove very beneficial, and no asthmatic child should be allowed to remain a mouth-breather.

In many cases the first attack of asthma in a child is the direct sequel of an acute bronchial infection, and subsequently all or the majority of attacks may follow a cold or bronchitis, to which some asthmatic children are especially liable. The infection may act in two ways. It may lead to a temporary increased permeability of the nasal or bronchial mucous membrane, which allows access to the blood of an effective dose of an allergen, such as that in feathers, with which the child can come into contact at ordinary times with impunity. The extremely irritable condition of the inflamed bronchial mucosa in acute bronchitis may also lead to bronchial spasm by a short or long vagal reflex. There is no evidence that a patient is ever allergic to the toxins of the infecting organism. It is consequently not surprising that by using adequate controls Knott demonstrated that autogenous vaccination has no direct effect on asthma. When, however, asthma is secondary to chronic respiratory tract infections in patients over 35,

short courses of prophylactic inoculations in the spring and autumn often appear to reduce the liability to infection and to the resulting asthma.

A distended stomach and a distended rectum may both produce reflex attacks of asthma, which is never caused by alimentary toxæmia.

Psychological Causes.—The most common psychological exciting cause in asthma is expectation. An asthmatic who has been accustomed to having attacks in certain places or under certain conditions is very likely to continue to do so when the original allergic or reflex causes have ceased to be operative. Frequent repetitions result in a well-established conditioned reflex. Thus an attack caused by pollen or food during a visit to a certain town may produce reflex asthma conditioned to the town even at a time when neither the pollen nor the food is in season. Certain emotions may also give rise to attacks, as Floyer pointed out 200 years ago. Of these, annoyance—often manifested as outbursts of temper—excitement, and anxiety are the most common. A frequent cause of temper is the strict diet imposed upon a child on account of positive skin reactions to certain foods. It is too much to expect a small boy not to feel resentful on being forbidden to eat a favourite food when he sees his brother and sister and friends enjoying it. It is far better to send him away from home to surroundings in which he can eat everything with impunity than to let him remain at home, where he comes to regard himself as differing in some strange way from other boys and girls. Laennec told how fright led to an attack in a patient of his when his night-light went out, corresponding with the patient of to-day who becomes severely asthmatic if he breaks his syringe or finds that he has left his adrenaline at home.

The bad influence of the home on many asthmatic children is to a great extent a reflection on their parents' anxiety. It is the psychological rather than the allergic atmosphere from which they need to be removed. Confirmation of this is provided by the frequency with which an attack follows the first visit of his parents to a child who has been moved to new surroundings. Except for encouragement and simple explanatory talks for older children direct psychotherapy is rarely required, but it is always important to teach the parents of asthmatic children the proper attitude they should adopt towards them. The first essential is to hide completely any anxiety they may feel. A spirit of optimism should be instilled into both the patient and his parents, and they should be made to realize that improvement is likely to occur before long and that conditions which have hitherto given rise to asthma may at any time cease to do so. The child should not be pampered, but be encouraged to lead as normal a life as possible. He should be kept in bed for bronchitis but not for asthma. He should be sent to a boarding school at as early an age as possible.

Treatment.—Hurst lays stress upon the importance of *suggestion* in the treatment of asthma, and creates a favourable atmosphere for his views by rehearsing the various 'cures' which in their heyday produced favourable results in 80 per cent of cases, but which have now passed away and been forgotten.

Expiratory exercises he regards as of great use, increasing the capacity for exertion without dyspnoea. All possible games should be permitted, though, if necessary, a preliminary dose of ephedrine or theophylline may be taken. *Allergic desensitization* he regards as only justifiable when a patient is sensitive to an allergen which it is impossible for him to avoid without grave inconvenience, and "even then it is doubtful whether any good effect it may appear to have is not the result of suggestion". *Kapok pillows* should be substituted for feather pillows in most cases. A small dose of *iodine* at night may shorten the nocturnal distress—it is better not combined with stramonium.

Theophylline mono-ethanolamine is of great value in the prevention of attacks during exercise and sleep, and may even abort mild attacks if taken early enough.

It is more effective and less upsetting than ephedrine. It is sold under the trade name of 'theamin', in 3-gr. capsules. In children 1 or 2 gr. is often sufficient.

Ultimately relief from *adrenaline* is the greatest of all. The essentials of a good 'adrenaline technique' are that the injection should be given early, in small doses and slowly, and where properly carried out the asthmatic's life should be tolerable.

REFERENCE.—¹*Brit. med. J.* 1943, 1, 403.

ATELECTASIS, PULMONARY. (See LUNG, COLLAPSE OF.)

BILE-DUCTS, CONGENITAL ATRESIA OF.

Sir John Fraser, M.Ch., F.R.C.S.Ed.

There are a number of clinical conditions associated with evidence of jaundice in the newborn child—icterus neonatorum, erythroblastosis foetalis, septicæmia associated with hæmolytic, the hepatic cirrhosis of congenital syphilis, obstruction of the bile-ducts by inspissated bile or mucus, congenital atresia of the bile-ducts. It is in relation to the last mentioned that surgery can play a part, and in recent years it has come to be recognized that when the diagnosis of congenital atresia of the bile-ducts is established, it is proper to give the infant the chance which surgery alone can offer.

There are occasions when the differential diagnosis may present difficulties, but a careful analysis of the clinical picture should permit the identification of a condition which can be relieved by surgical means; for example, in icterus neonatorum the jaundice is temporary, disappearing at the end of the second week, the liver is not enlarged, and the stool contains bile-pigment; in erythroblastosis foetalis the jaundice is associated with enlargement of the liver and spleen and an increase in the number of erythroblasts; moreover the condition is usually fatal in the first few days or weeks of life; jaundice of septic origin is recognized by its association with fever, leucocytosis, progressive anaemia, and the persistence of bile in the stool; the jaundice of inherited syphilis may be identified by the family history, the general stigmata of the disease, the radiographic appearance of the bones, the enlargement of the liver, and the accepted blood-tests; obstructive jaundice from inspissated bile or mucus may present a picture indistinguishable from that shown in congenital atresia of the ducts, but in this instance the confusion is not of material consequence, because if the obstruction is complete and unyielding the demand for surgical intervention is equally positive.

When congenital atresia of the ducts exists, the baby may show no evidence of jaundice at birth; it usually appears on the second or third day, occasionally not until the tenth or fourteenth day. The variation in the time of its appearance does not indicate that the atresia is a post-natal development; it is explained by the fact that relatively little bile is produced until post-natal life begins. The child is usually well nourished at birth, and indeed may appear normal until the acholic stool and the development of jaundice are noticed. The jaundice, slight at first, gradually deepens, and in the absence of treatment it becomes intense; the liver and spleen are enlarged. There is considerable variation in the position and extent of the atresia, but two types offer possibilities of relief by operation—those that have a patent hepatic duct, the remainder of the system showing atresia, and those that have a normal gall-bladder, cystic and hepatic ducts, the common duct being obliterated. It is estimated that from 17 to 20 per cent are of the operable type.

A. Strauss, J. Gross, and S. Kyman¹ have reviewed the operative possibilities,

and they urge the advisability of early operation as the only means of preserving life. They record a successful case operated on thirty-five days after birth, the common bile-duct being anastomosed to the first part of the duodenum.

REFERENCE.—¹*Ann. Surg.* 1943, **117**, 723.

BILHARZIASIS. *Sir Philip Manson-Bahr, C.M.G., D.S.O., M.D., F.R.C.P.*

The clinical features of intestinal bilharziasis form the subject of an important paper by M. Gelfand.¹ In S. Rhodesia it is the commonest disease next to malaria; it causes many deaths, and moreover predisposes to avitaminoses, tuberculosis, pneumonia, and many other diseases, whilst it is also responsible for serious economic loss.

Intestinal bilharziasis is a chronic infective illness with many resemblances to syphilis and tuberculosis. It may indeed attack practically every organ. In focusing attention on local bowel or bladder symptoms general constitutional disturbances tend to be overlooked so that correct diagnosis is often missed when local symptoms are absent.

Bilharzia mansoni almost invariably involves the large intestine and rarely the bladder, but, on the other hand, there may be no bowel symptoms, but lack of energy and loss of weight. Three main clinical varieties are recognized in S. Rhodesia.

Group 1.—This comprises the largest proportion during the invasion stage when patients manifest urticaria and pyrexia within a few weeks of exposure to infection. The author describes what appears to be the first instance of this in a European boy aged 10, who infected himself whilst bathing. Three weeks later he had a sudden rigor (102° F.). Four days later there was swelling of the penis with urticarial swellings all over the body. The pyrexia continuing, the blood-eosinophilia was found to be 33 per cent. After ten weeks *B. mansoni* eggs were found in the faeces.

The loss of weight may be severe. Other cases complain of epigastric pain and flatulence (simulating peptic ulcer or chronic cholecystitis), debility, loss of energy, low fever, chronic cough due to irritation of the lungs by deposition of eggs. On the other hand, mental retardation and epileptiform seizures are not due to this form of bilharziasis.

Group 2.—Here bowel symptoms are the chief complaint. Abdominal pain, periodic mild diarrhoea with blood and mucus and numerous eggs in the faeces, but sometimes *constipation*, may be the main trouble.

Group 3.—In this group the stage of deposition occurs 10–30 years subsequent to infection. Eggs in the liver cause hepatitis, later cirrhosis of the liver and splenomegaly (especially in natives). Cirrhosis itself may not develop for years, being unaccompanied by transitory jaundice, and may closely resemble infective hepatitis. Death may take place from pneumonia, tuberculosis, cholæmia, portal thrombosis, carcinoma, or hæmorrhage. In the earlier stages antimony may effect cure, but it cannot do so when once cirrhosis has developed.

REFERENCE.—¹*Clin. Proc., Capetown*, 1942, **1**, 247.

BLACKWATER FEVER.

Sir Philip Manson-Bahr, C.M.G., D.S.O., M.D., F.R.C.P.

An important and exhaustive paper covering a wide field is that by H. Foy, A. Altmann, H. D. Barnes, and A. Kondi.¹ In this study they have endeavoured to examine the present status of the problem of anuria and oliguria occurring in blackwater fever, favism, incompatible blood transfusion, and crush injuries, and in doing so they are led to assume that the renal abnormalities in all these diseases have essentially a similar basis. The hypothesis that the anuria is the result of mechanical blockage of the renal tubules with products of blood

destruction, especially when the urine is acid, does not suffice to account for all these facts. Thus the idea that anuria can be prevented by the alkalinity of the urine is not borne out and appears physiologically to be unlikely.

From a critical survey of previous work they reach the conclusion that the blockage is determined by antecedent factors of which diminished glomerular filtration is an important entity which leads to inadequate flushing, facilitating deposit of material in the lumen of the tubules. No single explanation can be advanced for the changes in renal function and the anuria which occurs in the intravascular hæmolyzes, but rather that they are due to a series of events which commence with a sudden hæmolysis and lead to other symptoms so characteristic of all these conditions.

The following factors which may be involved in reducing renal function are then considered: (1) The effects of hæmoglobin on renal metabolism; (2) Hæmoglobinæmia in connection with permeability changes; (3) Electrolyte-acid-base-water balances; (4) Osmotic pressure in relation to filtration and reabsorption; (5) Changes in glomerular filtration and tubular reabsorption; (6) Urinary pigments in relation to blockage; (7) Quantitative relation between tubular blockage and renal function; (8) Protein catabolism in relation to azotæmia; (9) Favism; (10) Sulphonamide hæmoglobinurias; (11) Crush injuries.

In the present state of knowledge it is difficult to decide whether hæmoglobin is a toxic substance. Many of the toxic effects which have been described may be attributable to other complicating factors. It is pointed out that hæmoglobin metabolism in man, dogs, cats, and rabbits is not comparable and therefore the results of hæmoglobin injection in lower animals should not be lightly referred to man.

The interpretation of *in vitro* experiments are not always applicable *in vivo*. Thus methæmalbumin is found in all intravascular hæmolyzes in primates and can always be produced *in vitro* by incubation of a primate plasma-hæmoglobin system, provided the pH rises above 8.6. This pigment is never found in the urine and there is no quantitative relation between methæmalbumin in the plasma and methæmoglobin in the urine. There is evidence that hæmoglobin is reabsorbed by the tubular epithelium of the kidneys.

B. Macgrath, G. M. Findlay, and N. H. Martin² have studied the mechanism of lysis of the red blood-cells in blackwater fever. They observed that slices of certain tissues will lyse saline suspensions of washed red cells, but only if they have been first thoroughly washed in saline, and they do not lyse unwashed red cells. Lysis can be prevented by addition of animal serum to the mixture (even heterologous serum with a definite zone of dilution), even by the addition of sodium cyanide (1-20,000,000) or mercuric chloride (1-32,000) or by heating tissue slices to 80° C. The lytic agent appears to be species-specific, but the serum inhibitor is not. This lytic agent appears to be an enzyme, though this has not been definitely proved. This exists in the animal body, but is held in check by an inhibiting substance present in tissues and serum. Abnormal lysis, as in blackwater fever, may therefore be due to interference with activity of the inhibitor.

REFERENCES.—¹Trans. R. Soc. trop. med. Hyg. 1943, 36, 197; ²Nature, Lond. 1943, 151, 252.

BLADDER, SURGERY OF.

Hamilton Bailey, F.R.C.S.

Suprapubic Cystostomy.—R. L. Payne¹ contributes a valuable addition to the technique of this operation which he has practised for 25 years. He rightly emphasizes that in a great number of instances the bladder may require re-opening, and at the second operation there is a danger of opening the peritoneum. Therefore, at every primary operation he dissects the peritoneum off the bladder

wall back to the dome of the bladder, and maintains it in this out-of-the-way position by sutures passed through the posterior rectus sheath and the superficial layers of the bladder wall (*Plate II*).

Bladder Fistulæ.—

Vesico-intestinal fistula: R. W. Barnes and M. R. Hill,² as a result of investigation of 16 cases occurring at the Los Angeles Hospital, confirmed that the commonest cause of vesico-intestinal fistula is diverticulitis of the colon. The most dependable means of diagnosis is the cystoscopic appearance after having obtained concrete evidence that the patient does pass gas with the urine. There is a characteristic area of acute inflammation and œdema which covers the fistulous opening and prevents identification of the orifice; the remainder of the bladder mucosa is only slightly inflamed. Cystograms, barium enema or meal, injection of dye into the bladder or into the rectum—all may be helpful in individual cases, but all or any often fail to provide concrete evidence of the fistula.

J. A. Lazarus and M. S. Marks³ found that carcinoma of the rectum is the cause of the fistula in approximately 50 per cent of cases.

Vesico-vaginal fistulæ have been very common in Egypt from the earliest times. G. C. Ward⁴ says that a mummy of an Egyptian queen who reigned in 2050 B.C. showed the presence of a large vesico-vaginal fistula. N. Mahfouz, contemporary Professor of Gynecology in Cairo, has operated upon 400 cases in

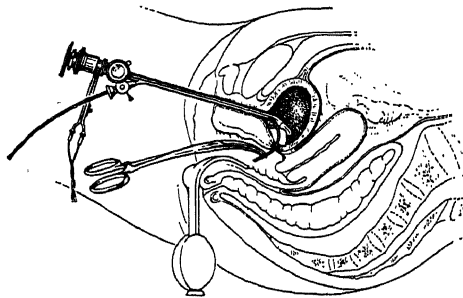


Fig. 11.—Demonstrating a vesico-vaginal fistula by means of a ureteric catheter. The cause of many cases of incontinence of urine in women is cleared up by this procedure.

high incidence of the condition 30 years, and this authority attributes the high incidence of the condition in Egypt to neglected labour.

W. J. Reich and J. L. Wilkey⁵ stress that for the absolute diagnosis of a vesico-vaginal fistula, cystoscopy is essential. The passage of a ureteric catheter through the fistula into the vagina (*Fig. 11*) is also the first step in the repair of the fistula by the method they detail. After the operation they insert a Foley's bag into the bladder and nurse the patient prone, as shown in *Fig. 12*.

Osteo-vesical fistula: B. S. Abeshouse and M. Gellman⁶ discuss the management of those difficult cases where necrosis of the pelvic bones, notably the pubis, communicates with the bladder, forming what may be called an osteo-vesical fistula. Such cases are seen in civil practice from time to time from varying causes; they are more frequent in times of war. The condition is

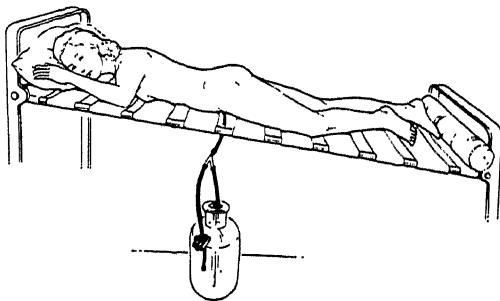
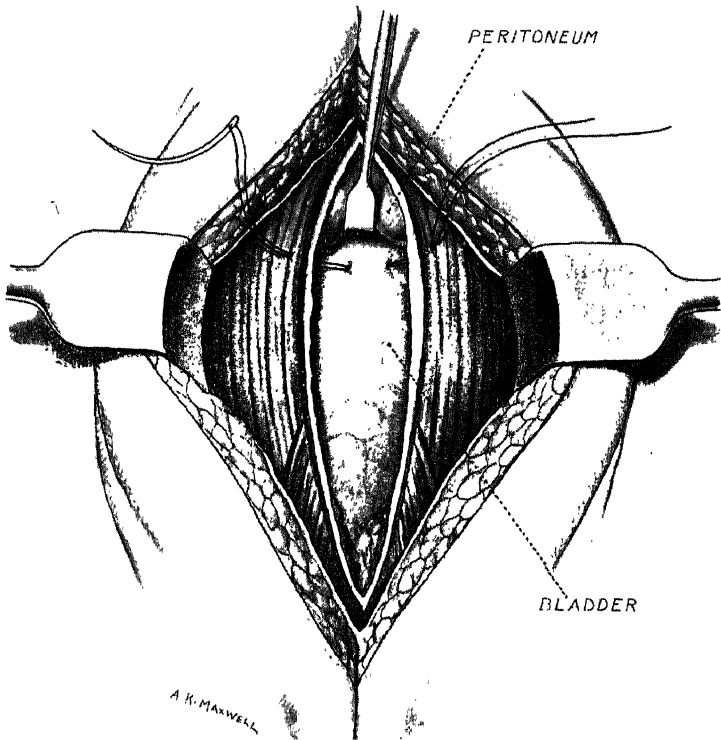


Fig. 12.—Position after an operation for vesico-vaginal fistula. Foley's bag has been inserted into the bladder. (After Reich and Wilkey.)

PLATE II

SUPRAPUBIC CYSTOSTOMY

(R. L. PAYNE)



Payne's method of ensuring that the peritoneum remains out of danger when a suprapubic cystostomy incision is reopened. At the primary operation the measure illustrated is carried out.

PLATE III

DIVERTICULUM OF THE BLADDER

(A. J. C. HAMILTON)



Cystogram showing a diverticulum on each side.

PLATE IV

HUNNER'S ULCER OF THE BLADDER

(HAMILTON BAILEY)



Section showing a Hunner's ulcer treated by partial cystectomy. The patient, a woman of 45, suffered from intractable cystitis for six years.

prevented if cases of ruptured bladder and urethra associated with fractured pelvis are treated adequately in the first instance, particularly as to diverting the urinary stream from the prevesical space. Once osteomyelitis has set in and the sinus communicates with the bladder, the chances of spontaneous recovery are remote. In due course excision of the osteo-vesical fistula, which in often a very difficult procedure, is the only hope of a cure. In resecting the vesical end of the fistula care must be exercised to remove the entire infected area and a small portion of healthy bladder wall. The opening is closed and the urine diverted by a suprapubic cystostomy. After removal of sequestra and infected areas of bone, the prevesical space must be adequately drained, and often post-operative irrigation with Dakin's solution or azochloramide is indicated.

Diverticulum of the Bladder.—This is not a pathological curiosity. Indeed A. J. C. Hamilton⁷ considers it to be an every-day ordinary case, and the possibility of its presence should be in the mind of the general surgeon and the general practitioner. The commonest age of incidence is the sixth decade and it is practically confined to males. The reason it escapes notice is that there are no characteristic symptoms. The symptoms are those of bladder neck obstruction combined with urinary infection. Haematuria occurring as a manifestation of infection is a leading symptom rather frequently. From time to time cases are met with where the diverticulum causes a pelvic swelling to one side of the middle line. The diagnosis rests fundamentally on cystoscopy. Diverticulography is useful in assessing the size of the diverticulum. A ureteric catheter is passed into the diverticulum, and if it can be made to coil up therein, a radiograph is taken while the cystoscope is still in position. Radio-opaque medium is then injected and a second radiograph is taken. Cystography in the usual meaning of the term is also of fundamental diagnostic importance (*Plate III*). After cystograms have been taken, a catheter should be passed and a further radiograph taken. If the diverticulum is still visualized, it must contain what Swift Joly calls "concealed residual urine".

M. A. Llanos⁸ says that in a few cases of bladder diverticulum micturition occurs twice in rapid succession. The complications are: (a) infection; (b) stone formation within the diverticulum; (c) tumour formation within the diverticulum; (d) perforation; and (e) pressure upon a ureter.

A. J. C. Hamilton⁷ emphasizes that small, often multiple, diverticula require no treatment, but a large, solitary diverticulum should be excised by the extra-peritoneal route. What is very important is that the diverticulum should be removed before the surgical treatment for the concomitant enlarged prostate, if it is inadvisable to perform the two operations together. Because the diverticulum harbours infection, it is often disastrous to remove the prostate first.

In operating upon a patient aged 69 with a large, very adherent diverticulum, J. J. Bottone and F. L. Senger⁹ came to the conclusion that it was unwise to attempt complete diverticulectomy. The bladder wall was incised down to the neck of the diverticulum, which was detached from the bladder. The bladder was then reconstructed and drained with a de Pezzer catheter, leaving the detached diverticulum in situ. The diverticulum was closed about a No. 28 de Pezzer, thus creating two independent sacs, each with its own drainage to the exterior. The diverticulum was irrigated several times a day and the infection therein subsided slowly. Later, in order to obliterate the mucosal lining one or two ounces of a 30 per cent sodium chloride solution were employed as a sclerosing agent. It was permitted to exert its effect for two hours and was then drained off. This treatment continued twice a week until there was practically no drainage from the diverticulum. The catheter was then withdrawn and the end-result was satisfactory.

Management of the Paralysed Bladder.—E. W. Riches¹⁰ finds that in spite of the teaching of Sir John Thomson-Walker and others who had a large experience of paralysed bladders consequent upon spinal injuries, intermittent or in-dwelling catheterization is still in general use, both at home and in the field. Catheterization of the paraplegic patient, unless performed with absolutely ideal aseptic ritual (hardly obtainable even in special clinics), results in incurable infection which eventually kills the patient. The proper course is to withhold a catheter altogether. There is no immediate need to empty the bladder; it can be left for at least 24 hours. If there is further delay, overflow incontinence is likely to result. This does not introduce infection, but unless the patient is properly protected, it favours the development of bed-sores. If overflow incontinence fails to develop and there are no facilities for operation, and particularly if the patient is in pain, suprapubic aspiration with a lumbar puncture needle should be done with aseptic precautions, and a note made as to the time of its performance so that it can be repeated, if necessary, in six hours. When the patient reached surgical surroundings suprapubic cystostomy should be carried out. Riches emphasizes how important it is to make the suprapubic opening as high as possible, i.e., about half-way between umbilicus and symphysis. A low suprapubic opening may be likened to a badly-planned amputation: both are unsuited to a properly-fitting appliance. C. Morson¹¹ regrets that Riches should advocate suprapubic puncture to be repeated at intervals, for in the majority of cases it will lead to prevesical cellulitis.

F. J. Barrington et al.,¹² referring to the technique of cystostomy for these cases, say that the skin incision need not be longer than 2 in. After exposing a small area of the summit of the distended bladder, a finger is inserted into the wound to draw up the peritoneum. A trocar and cannula, or a spiked introducer with a No. 28 reinforced Malecot catheter stretched upon it, is plunged immediately below the finger through the anterior vesical wall. The operation must not be a blind one. Preferably an angled Malecot catheter should be used and the tube should be changed every 10–14 days. Alkalinity of the urine must be avoided by suitable medication and irrigations.

K. I. Nissen¹³ says that stone formation follows prolonged recumbency in traumatic paraplegia with distressing frequency. Bladder drainage need not interfere with frequent turning of the patient from one side to the other during the day.

Cystitis.—L. A. Le Doux¹⁴ has found that *premenstrual cystitis*, although not a serious condition, is one which often goes unrecognized and is most annoying to the patient. In a few cases *Trichomonas vaginalis* is the underlying cause, but in most instances if the bowels are properly regulated and menstrual hygiene attended to, the condition can be eradicated by a course of urinary antiseptics. It is to be noted that very few patients with this condition have been pregnant, and none of them showed any signs of a cystocele.

J. E. Fleischner¹⁵ stresses that *cystitis in females* unaccounted for otherwise is often due to an unhealthy cervix. The bladder is infected by way of the lymphatics as well as by continuity. Treatment of the cervix, particularly by electro-coagulation, is often followed by a cure of the cystitis.

The commonest cause of *haematuria in cattle* is, according to A. Sutherland,¹⁶ cystitis. The symptoms are kicking at the belly, switching of the tail, and straining. Bladder washes of acriflavine are recommended.

Improper Function of the Bladder after Childbirth.—J. R. Perdue¹⁷ describes this as one of the biggest little problems in post-partum cases. He gives a number of highly practical details on how to encourage the patient to empty the bladder completely at regular intervals. If catheterization becomes necessary, a small rubber catheter should be used and gentle sustained pressure applied

above the pubis only after the stream has stopped. This is maintained until the catheter is removed, in order to prevent the entry of air into the bladder. Not more than 1000 c.c. of urine is removed at one time. After catheterization 1 oz. of $\frac{1}{2}$ per cent solution of mercurochrome is instilled.

Hunner's Ulcer (Plate IV).—This is frequently overlooked even by a competent cystoscopist because it presents such an innocent appearance as to be looked upon as merely a local area of capillary dilatation of the bladder mucosa, such as is seen in patients recovering from cystitis. One characteristic alone is common to all cases—bleeding on distension of the bladder. For this reason the cystoscopist should constantly bear the condition in mind and not exclude the presence of Hunner's ulcer unless the bladder has been moderately distended. Frequency and pain, otherwise unexplained, in the absence of pyuria should arouse suspicion (J. L. Emmett¹⁸).

Cystoscopic Photographs.—L. E. McCrea¹⁹ has perfected a camera for obtaining these photographs. Technical details are given.

REFERENCES.—¹*Ann. Surg.* 1943, 117, 783; ²*Calif. West. Med.* 1942, 56, 350; ³*Amer. J. Surg.* 1943, 59, 526; ⁴*J. Mt. Sinai Hosp.* 1943, 10, 176; ⁵*Urol. cutan. Rev.* 1943, 47, 160; ⁶*Ibid.* 88; ⁷*Edinb. med. J.* 1943, 50, 513; ⁸*J. Urol.* 1943, 49, 628; ⁹*Urol. cutan. Rev.* 1943, 47, 79; ¹⁰*Proc. R. Soc. Med.* 1943, 36, 198; ¹¹*Ibid.* 202; ¹²*Ibid.* 197; ¹³*Ibid.* 201; ¹⁴*Sth. med. J.* 1943, 36, 22; ¹⁵*Urol. cutan. Rev.* 1943, 47, 553; ¹⁶*Vet. Rec.* 1943, 55, 269; ¹⁷*Urol. cutan. Rev.* 1943, 47, 245; ¹⁸*Proc. Mayo Clin.* 1942, 17, 261; ¹⁹*Amer. J. Surg.* 1942, 56, 622.

BLOOD REGENERATION AFTER HÆMORRHAGE.

Stanley Davidson, M.D., F.R.C.P.

H. W. Fullerton, M.D., M.R.C.P.

At first sight it would be expected that the degree of anæmia and the rate of blood regeneration following loss of a known quantity of blood would show a fair degree of uniformity in different individuals. However, this does not appear to be the case. S. Alstead¹ withdrew varying quantities of blood by venesection from 48 male subjects. There was marked variation in the time taken to reach the lowest level of hæmoglobin, the extent of the fall in hæmoglobin was often disproportionate to the amount of blood withdrawn, and there appeared to be no correlation between the volume of blood lost and the persistence of anæmia. The author suggests that these apparent discrepancies may be due to: (a) variation in the speed and degree of hæmodilution occurring after hæmorrhage, which may be dependent on the volume of the fluid reserves in the tissue spaces; and (b) variation in the body's reserve stores of iron and other materials necessary for blood regeneration. Obviously further work along these lines is indicated, and as the author suggests, estimations of the blood volume following blood loss might well throw some light on the existing perplexities.

REFERENCE.—¹*Lancet*, 1943, 1, 424.

BLOOD TRANSFUSION. L. E. II. Whitby, C.V.O., M.C., M.D., F.R.C.P.

The volume and complexity of the literature of this subject shows that it has become highly specialized. Such matters as the finer degrees of compatibility, the elimination of grouping errors, and the selection of the ideal donor now demand a complicated laboratory technique, which has replaced the simple bedside tests. The multiplicity of corpuscular factors requires considerable knowledge of genetics for an understanding of all the factors that may complicate a simple case. Moreover, the choice of fluid for the now numerous conditions for which transfusion is employed, which was at one time either simple or dictated by available supplies, now requires a clear understanding of the physiological requirements of the circulation. These developments, as yet far from complete, have come about as the result of National Transfusion

Services ; they show clearly that such services will need to be continued after the war.

THE USES OF BLOOD, BLOOD SUBSTITUTES, AND PROTEIN DERIVATIVES

The current year contains many reviews as to the relative merits and the uses of blood, blood substitutes, and protein derivatives. Apart from using these substances for restoration of oxygen-carrying power or restoration of blood volume, there has been considerable development of the idea of supplying essential protein to the under-nourished by the intravenous route. This is no more than an extension of the well-established procedure of supplying intravenous glucose for carbohydrate metabolism, but it has emphasized the ill effects that may arise from hypoproteinæmia in subjects unable to support themselves by alimentation, and has supplied an appropriate method of treatment. Suitable protein given by the intravenous route has been shown experimentally to be satisfactory as the sole source of nitrogen for hypoproteinæmia, not only for increasing plasma protein itself, but also for supplying all essentials for protein metabolism, including hæmoglobin formation.

G. H. Whipple and colleagues¹ have concluded that this is a valuable method of therapy for states associated with deficient nitrogen intake or with tissue injury, coupled with accelerated nitrogen loss, including hæmorrhage, burns, and major operations. E. Elman and H. W. Davey² have used plasma transfusions in this way, whilst R. Elman³ and R. Landesman and V. A. Weinstein⁴ claim success with hydrolysates of casein (marketed as a powder called Amigen), either alone or as a supplement to plasma transfusion. G. H. Whipple and colleagues,^{1, 5} have also shown the efficiency of Rose's growth mixture of ten crystalline amino-acids for this purpose. J. Henderson's⁶ collective review on the present status of blood substitutes concludes that, taking all factors into consideration, plasma is the most satisfactory blood substitute available at the present time, and has not infrequently an advantage over blood itself, as in the treatment of hypoproteinæmia and certain blood dyscrasias characterized by hæmolytic tendencies or fibrinogen deficiency. Similar views are expressed by L. R. Newhouser and E. L. Lozner.⁷ Likewise, A. C. Ivy and colleagues⁸ have evaluated blood substitutes from the experimental aspect and demonstrated, under the conditions of their experiments, how inferior are such substances as gelatin, pectin, and acacia, in their present state, as compared with serum or plasma ; they point out that though saline has only a transitory effect in restoring blood volume, yet this sometimes may be of value in an emergency ; they emphasize, too, that sodium citrate in plasma may be toxic if administered very rapidly in large amount ; this, however, is a feature always more prominent in animal experiment than in human beings, and is largely dependent on rate.

Studies by J. F. Loutit and colleagues^{9, 10} on various preservatives for stored blood have shown that 100 c.c. 2 per cent disodium citrate (monohydric) ; 20 c.c. 15 per cent glucose (or 10 c.c. 30 per cent glucose) is very suitable for admixture with 420–430 c.c. blood. The preservative power, as judged by *in vivo* survival tests, is superior to most other anticoagulants in common use. Furthermore, the mixture can be autoclaved without caramelization. The Edinburgh School^{11, 12} have carried out further studies on the survival, in stored blood, of complement, phagocytic, and opsonic powers, and have concluded that quite 50 per cent of these elements disappears with a few days of storage. They recommend that when it is desired to transfuse these substances the blood should be no more than 48 hours old, and preferably less. These findings confirm the views again expressed by Julian Smith¹³ as to the superiority of fresh unmodified whole blood, directly administered, for the treatment of anæmias, hæmorrhagic states, and infections.

RHESUS FACTORS

As indicated in the review of this subject in the MEDICAL ANNUAL, 1943, it was then apparent that the rhesus factor consisted of a group rather than one specific entity. Much intricate serological work by R. R. Race, G. L. Taylor, and colleagues,¹⁴ as well as by A. S. Wiener,¹⁵ has shown how complex the subject has become and how much more so it is likely to prove in the future. The most remarkable of the discoveries has been the finding of a serum containing an agglutinin active against the recessive rh factor, whether it be homozygous or heterozygous. This serum is known in the English literature as *St* from the first two letters of the name of the patient from whom it was derived. It would appear, therefore, that the recessive rh factor is, like the O factor, something more than a mere absence of the dominant Rh, in that it is able to act as an antigen. This gives an explanation of some of the apparently anomalous cases of erythroblastosis foetalis, such as are described by R. R. Race, G. L. Taylor, and colleagues,¹⁶ arising from a rhesus-negative father and a rhesus-positive mother. Present knowledge indicates that multiple allelomorphs of the rhesus gene occur, and that at least six may be assumed; those definitely identified are known as Rh, Rh₁, Rh₂ and rh, whilst two, as yet temporarily known as Rh_x and Rh_y,¹⁴ are awaiting final naming to bring them into the system begun by A. S. Wiener. With regard to erythroblastosis foetalis, it should be appreciated that though the rhesus factor is the one most commonly involved, there are rare examples, such as those described by K. E. Boorman, B. E. Dodd, and P. L. Mollison,¹⁷ in which AB factors may be the cause of a similar condition.

The practical aspect of this complex subject has been dealt with in an M.R.C. *Memorandum*,¹⁸ which recommends: (1) As an ideal, rhesus-negative persons should be transfused only with rhesus-negative blood. (2) Mothers of infants which manifest erythroblastosis foetalis should not be transfused with blood unless rhesus-negative blood of the appropriate A B O group is available; in an emergency, plasma or serum should be used instead. (3) When transfusions are given to infants suffering from erythroblastosis foetalis, blood from a Group O rhesus-negative donor should be used if possible. If no such blood is available, then the mother's cells, washed free from plasma and resuspended in saline, provide a safe alternative. If this again is impracticable, then an ordinary Group O donor must be used, with the appreciation that such a donor will probably be rhesus-positive, and so cause a transient increase in the jaundice. In these circumstances, it is better to seek a donor among the maternal relations than to use the father or his relations.

The influence which appropriate transfusion may exercise upon the prognosis in erythroblastosis foetalis is strikingly shown by the 8 cases reported by A. S. Wiener and I. B. Wexler,¹⁹ and from a series of 19 cases described by J. D. Gimson.²⁰ In the last-named series, 16 survived despite the fact that they were mostly late-treated cases; the author points out that the transfusions were larger than those usually given (10–15 c.c. per lb. of body weight), being calcu-

lated from the formula
$$\frac{\% \text{ rise Hb required}}{100} \times \text{blood volume}$$
; the blood volume

is reckoned as 88 c.c. per kilo of body weight (40 c.c. per lb.), taking the weight as the anticipated weight for age in relation to the birth weight; the transfusions were administered intravenously, at a rate of 15–20 c.c. per hour.

(See also HÆMOLYTIC DISEASE OF THE NEWBORN AND ITS TREATMENT.)

HÆMOLYTIC AND OTHER REACTIONS

The prime necessity in order to avoid hæmolytic reactions is the correct determination of the Landsteiner blood group of recipient and donor, as well

as a direct cross-matching test. The difficulties and fallacies of this oft-considered simple procedure are fully set out in M.R.C. *Memorandum No. 9* (1943), which explains the error that may arise with low titre sera, sera that will not detect the insensitive A_2 factor, failure to appreciate the time factor, infected sera or cell suspensions, cold agglutination and pseudo-agglutination or rouleaux formation; the intricacies of sub-groups are explained, as well as the very careful technique necessary for the detection of rhesus agglutinogens and agglutinins. Haemolytic reactions may be of all grades, from the severe acute and fatal, to what is nowadays called "inapparent", that is, where the reaction is symptomless, and revealed only by the fact that the anticipated rise in haemoglobin is either not obtained or not maintained; the point may be specifically looked for by observing the rate of elimination of the transfused cells from the patient's circulation, using the differential agglutination test described by A. S. Wiener²¹ and by J. V. Dacie and P. L. Mollison.²²

"Inapparent" reactions occur more frequently with anti-rhesus agglutinins, with such rarities as anti M, N, and P factor agglutinins, and with the irregular agglutinins of the sub-groups of A, than with the classical anti-A and anti-B of the Landsteiner groups. P. L. Mollison²³ has summarized the investigations that need to be carried out to determine the cause of haemolytic reactions. Blood destruction may be intravascular, in which case bilirubinæmia, methæmalbuminæmia, hæmoglobinæmia, and hæmoglobinuria may each or all be found; or it may be extravascular, in which case only bilirubinæmia occurs. Clinical jaundice appears if the serum bilirubin exceeds 4 mg. per cent. This distinction between intravascular and extravascular hæmolysis is largely theoretical; in practice, only the more rapid forms of hæmolysis give rise to the characteristic pigments; when intravascular destruction is slow, the free hæmoglobin in the plasma never reaches a detectable concentration, because it is rapidly absorbed by the reticulo-endothelial system. For example, with a mild hæmolytic anæmia the plasma contains only bilirubin, but with an exacerbation both hæmoglobinæmia and hæmoglobinuria occur.

Rapid intravascular hæmolysis occurs from grossly incompatible blood; it may also be found with aged stored blood, with blood stored at an unsuitable temperature, or in a solution not containing glucose. Intravascular hæmolysis has also been obtained by injecting plasma containing high titre incompatible agglutinins, whilst J. V. Dacie and D. Firth²⁴ have found that the transfusion of blood to a case of nocturnal hæmoglobinuria (Marchiafava-Micheli disease) may cause an acute exacerbation of the hæmolytic process; in this last case, the differential agglutination test referred to above showed that the hæmolytic process affected the recipient's own cells and not the transfused blood. It should be borne in mind that the transfusion of infected blood may give rise to symptoms simulating intravascular hæmolysis. Investigations should, therefore, include cultures of the transfused blood and a blood culture from the recipient.

Minor degrees of incompatibility, or incompatibility in which the onset of clinical symptoms is delayed, may be quickly detected by the improved biological test advocated by A. S. Wiener and colleagues.²⁵ This shows small increases in plasma pigment following upon the injection of 50 c.c. of the donor's blood. The principle of the test is to compare the pigment in the supernatant plasma of the recipient before and one hour after the injection of the test dose of 50 c.c.

The violent hæmolytic reaction of a grossly incompatible transfusion gives rise to considerable symptoms of shock. In the MEDICAL ANNUAL, 1943, it was described how this disaster had been successfully treated by splanchnic block. Confirmation of the efficacy of this method is given by the work of S. T. Sakharian,²⁶ who describes the value of novocain lumbar block. The

block should be bilateral in cases of renal vascular spasm, 100–200 c.c. of 0.5 per cent solution being given on each side.

Of other transfusion reactions, R. J. Drummond²⁶ has pointed out how the prevailing fashion for massive and rapid transfusion carries with it a grave risk of circulatory overloading when applied to unsuitable cases with a weak cardiac musculature, whilst Co Tui and A. M. Wright²⁷ describe how pyrogenic substances may be found as much in chemicals as in distilled water. These substances are especially common in sodium citrate, but may also be found in glucose and sodium chloride. The authors recommend the filtration of all such solutions through asbestos pads, which absorb any pyrogenic material.

TRANSMISSIBLE DISEASE

Further work on the survival of *Tr. pallidum* in frozen plasma by M. M. Ravitch and J. W. Chambers²⁹ shows that plasma heavily infected and kept at -20°C . for 48 hours or longer is non-infectious.

Hepatitis following injection of yellow fever vaccine is thought to be due to some agent in the human serum at one time used in the reconstruction of the vaccine. On account of the prevalence of infective hepatitis among troops and the general population, there have been considerable fears that this disease might be frequently transmitted by transfusion of blood, plasma, or serum. The disease so transmitted has a long incubation period (56–120 days), and this makes it difficult to trace recipients who may themselves, in the interval, have been exposed to the natural disease, which itself has a shorter incubation period (20–40 days); 7 cases of jaundice occurring four months after transfusion of blood or plasma are reported by P. B. Beeson,³⁰ 9 cases by H. V. Morgan and D. A. J. Williamson,³¹ and 5 by R. E. Steiner.³² The real frequency of this complication will not be known until there is a concerted effort to recognize such cases and to keep careful records of the source of all blood and plasma administered.

SPECIAL CASES

J. V. Dacie and P. L. Mollison³³ have shown that when red cells are transfused to a case of acholuric jaundice, the cells survive normally, whereas the cells of an acholuric are rapidly destroyed when transfused to a normal subject.

L. Watson³⁴ describes 23 cases transfused with red-cell concentrates, with admirable results; 18 of these were treated as out-patients.

M. H. Pappworth and J. F. Loutit³⁵ record 30 cases (19 severe) of gastrointestinal hæmorrhage treated with far more massive amounts of blood than are usually employed; their results show an improvement on the ordinarily expected prognosis.

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BLOOD TRANSFUSION: THE EFFECT OF VITAMIN K ON THE AGGLUTININ- ATING POWER OF THE SERUM.

Stanley Davidson, M.D., F.R.C.P.

H. W. Fullerton, M.D., M.R.C.P.

A peculiar effect of synthetic vitamin K, apparently first noted by J. K. Narat¹ in America, has been carefully studied by Marie R. H. Stoppelman,²

who found that each of three commercially prepared vitamin K analogues produced an alteration in the agglutinating power of the sera of patients to whom they were given. This effect occurred after both oral and intramuscular administration, and the dose necessary to produce it varied with the different analogues which were used. The sera of patients belonging to Groups A and B were found to agglutinate Group O cells and often cells of the patient's own group after vitamin K was given. The change disappeared two days after oral and three days after parenteral administration. Auto-agglutination was never observed, and no effect on the agglutination of the red cells of the patients by sera of Groups A, B, and O was noted.

The practical importance of these observations lies in the relationship of the phenomenon to blood transfusion. If the results are correct it is obvious that errors in the direct matching of bloods would occur when the recipient had received vitamin K recently. The author stresses the harmful consequences which might follow blood transfusion in patients whose agglutination reactions had been altered by vitamin K, but it is not clear whether or not such results have actually been observed by her. In view of the widespread use of vitamin K it is important that further work on this subject should be carried out.

REFERENCES.—1. *J. Amer. med. Ass.* 1941, **116**, 1310; 2. *Acta med. scand.* 1942, **111**, 408.

BLOOD-VESSELS, SURGERY OF. (See also VARICOSE VEINS.)

Lambert Rogers, M.Sc., F.R.C.S.

Thrombophlebitis and Pulmonary Embolism.—J. Fine, H. A. French, and A. Starr,¹ of Boston, remind us that statistics show that 1 out of every 17 to 20 persons with clinically recognized thrombophlebitis of the deep veins of the lower extremity will die of embolism, and 1 of every 6 to 12 patients who have survived one or more attacks of embolism will die of subsequent embolus. Recent treatment of such cases has variously consisted of (1) heparinization, (2) division of the femoral vein, (3) injection with novocain of the paravertebral sympathetic ganglia and nervous trunks, (4) administration of dicoumarin or its allies. Starr and his associates favour division of the common femoral vein and report a series of cases in which this was practised. Pain in the calf of a patient when first beginning to walk after operation or prolonged illness should not be ignored, as it may indicate thrombophlebitis of the deep veins of the leg. If doubt exists, venography may show the presence either of a thrombus or of venospasm. Formerly these writers divided the femoral vein below its junction with the profunda, but they now favour division of the common femoral vein proximal to the profunda termination, because in some cases it has been found that the profunda vein itself has been thrombosed. They find that, contrary to what might be expected, oedema of the leg is not aggravated by division of the femoral vein but that early resolution of the thrombophlebitic process occurs and such oedema as there is often disappears rapidly. If ilio-femoral thrombophlebitis has occurred, the thrombus is extracted through an opening in either the common femoral or iliac vein, which is then divided.

Dicoumarin (Dicoumarol).—From 1940 onwards K. P. Link² and his co-workers at the Wisconsin Experimental Station have reported the results of a remarkable series of researches into the cause of the haemorrhagic disease of cattle produced by sweet clover. They have identified, isolated, and synthesized the causative agent as 3:3 methylene bis-(4-hydroxycoumarin). Reports on the use of dicoumarin or dicoumarol as an anticoagulant are beginning to appear. N. W. Barker and J. T. Priestley,³ in America, and J. Lehmann⁴ in Sweden, write encouragingly of it (*Fig. 13*). Since September, 1941, N. W. Barker, E. V. Allen, and J. M. Waugh⁵ of the Mayo Clinic have given dicoumarin to 407 surgical

patients during their immediate post-operative convalescence. In 477 of the patients a satisfactory increase in prothrombin time was obtained. The patients were divided into groups, in each of which some idea of the expected incidence of thrombophlebitis and embolism could be obtained from previous experience—e.g., Group 1 consisted of patients in whom pulmonary embolism or infection had already occurred and in 44 per cent of whom, therefore, a subsequent episode of thrombophlebitis or pulmonary embolism might be expected to take place. The conclusions reached are that dicoumarol is effective as a prophylactic and has definite value as an anticoagulant; the only untoward effect from its use is occasional bleeding. No toxic effects have been observed, either

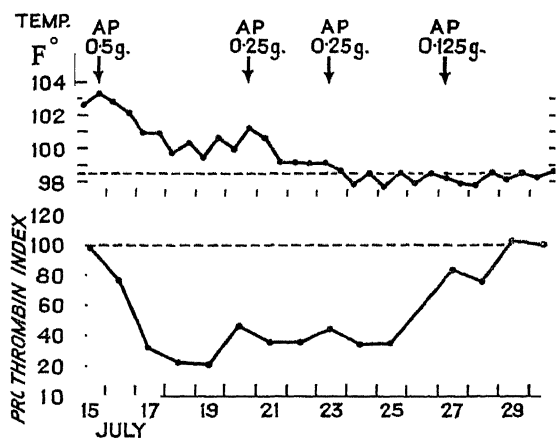


Fig. 13.—Post-partum crural thrombosis. Note the fall in temperature after every dose of A P and the relation between the temperature and prothrombin curves. A P = methylene-bis-(hydroxycoumarin). (By kind permission of 'The Lancet'.)

in man or animals. Should bleeding occur through elevation of the prothrombin time by dicoumarol, transfusion of fresh blood will reduce the time and arrest the hæmorrhage. Contra-indications to its use are (1) renal insufficiency, (2) the purpuras, (3) blood dyscrasias in which there is a tendency to bleed, (4) prothrombin deficiency—e.g., as in jaundice, (5) subacute bacterial endocarditis. Less definite contra-indications are (1) ulcers and open wounds, (2) the imminence of surgical operation, (3) gastric ulcer. In this group, however, if pulmonary embolism or thrombophlebitis has occurred, the risk of bleeding from the use of dicoumarol may be definitely less than the risk of further and possibly fatal embolism. Dicoumarol is given in doses of 300 mg. on the first day, 200 on the second, and 200 on each subsequent day that the prothrombin time is less than 35 seconds (normal 18–22). Further reports of the use of this preparation will be awaited with interest.

(See also article DICOUMARIN.)

Embolectomy.—Patients undergoing treatment for chronic cardiovascular disease should be constantly watched for embolic occlusion of the extremities. Captain A. Lesser⁶ of the U.S. Army Medical Corps reminds us that if embolectomy is not performed, about 90 per cent of these patients die within a fortnight whether the limb is amputated or not. Surgery should not be delayed beyond 6 hours. He reports 4 successful embolectomies from the common femoral artery. Major H. Agar,⁷ R.A.M.C., has reported his experience of 7 examples

in 5 patients, including a successful aortic embolectomy, and B. Wolman⁸ records a successful case in which J. J. Philip removed an embolus 7 hours after its lodgement at the bifurcation of the right common iliac artery of a patient with mitral stenosis and a regular rhythm. Noting that although a spinal anæsthetic had been given the vessels containing the clot were in spasm and X-ray examination of the chest showed that the left auricle was not enlarged, he refers to Sir Maurice Cassidy's contention that these cases are usually due to active endocarditis.

It is probable that, as certain writers have suggested, peripheral embolism and vascular occlusion are more common than is usually realized. Cases are overlooked probably because pain, contrary to what is commonly thought, is not necessarily present when embolism occurs. None of Agar's cases had severe pain and four had slight pain only. Sir Thomas Lewis⁹ has suggested that pain is due to ischæmia of muscles. It is therefore more likely to occur in those who are active at the time, and may be slight or absent in cardiac or bedridden patients. Numbness, tingling, or coldness in the affected limb are constant features, however, and, in a minor degree, as de Takats¹⁰ has pointed out, may constitute premonitory symptoms of an impending embolism and be the result of the release of minute fragments of a central clot about to break loose itself. The site of occlusion is not usually difficult to determine, as it is the first bifurcation of the main artery above the upper limit of the physical findings, e.g., numbness, coldness, pallor, or discoloration.

The immediate measures to be undertaken are three in number—namely: (1) Relief of arterial spasm, e.g., by the administration of papaverine hydrochloride (gr. $\frac{1}{2}$ to 1) intravenously at hourly intervals, or, as P. R. Linton and N. W. Roome¹¹ and others advocate, by the early use of paravertebral block; (2) The use of an anticoagulant, e.g., heparin or dicoumarol; and (3) Embolectomy. [In cardiac cases particularly, surgeons will do well to be on the lookout for the sudden vascular accident of occlusion of a main artery and be prepared to carry out these measures. Prompt intervention may save both life and limb.—L. C. R.]

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BRAIN ABSCESS.

Geoffrey Jefferson, M.S., F.R.C.S.

F. C. Grant¹ in one of his usual thoughtful papers has given an account of 100 consecutive cases of brain abscess. He says that although increased clinical experience plus the use of ventriculography have made diagnosis and localization relatively simple, the determination of the proper time to attack an abscess and the selection of the appropriate process remains a difficulty for the wisest. Of his 100 cases 10 died before anything could be done, and 9 had meningitis as well as an abscess. Grant frankly describes his 25 deaths in patients whose recovery might have been expected as due to bad operative technique. Grant's honesty is well-known and is most helpful to surgical progress. In all these cases, says Grant, "the surgeon had every opportunity to save the patient; in none was any great emergency present, and the operative procedure was planned and carried out deliberately in the manner that he considered to be best adapted to the problem at hand". Precisely the same method led to recovery in 47 patients. All neuro-surgeons agree that an abscess should not be attacked until encapsulation has occurred, a process that requires 3 to 4 weeks from the onset of symptoms. It is evident that certain brain infections with virulent organisms will never become encapsulated and that their problem is chemotherapeutic rather than surgical. Once an infection is

localized and an abscess has formed, the surgeon unfortunately is faced with three courses of action—open drainage (the classical method), closed drainage by repeated punctures (or drainage through a small drill-hole), or enucleation. The last-named is perhaps the ideal method, but out of 6 cases Grant lost 3. Of 48 cases treated by closed drainage 32 recovered, the 16 deaths being due to inadequate drainage or persistence of intracranial pressure leading to a fatality. By comparison the results of open drainage were exactly the same, for of 18 cases treated by this method 12 recovered and 6 died of meningitis and cerebritis. Grant concludes that conservative treatment, by which he means tap or tap and drainage through a small trephine in the bone, produces the better results in the long run. A wide open drainage did not lower the operative mortality in comparison, and a much higher proportion of patients were returned to their former occupation by the simpler procedures than when a more radical technique, which necessarily involves more destruction of brain tissue, was employed. The initial attack upon a brain abscess should be carried out through a small trephine opening and the abscess tapped. Frequent tapplings ought to be much the same thing as drainage. If the abscess refills very quickly a small drainage tube should be inserted. If the patient does not progress, more radical measures must be resorted to, but they involve the patient in greater risks of neurological sequelæ. The present writer agrees with Grant's conclusions; the most unfavourable cases are those where the abscess is small and deeply situated.

E. A. Kahn² was probably the first to recognize the value of contrast media introduced into the brain abscess to allow of their visualization by radiography. The advantages of being able to see on an X-ray film the exact site, size, and shape of a brain abscess need no elaboration. The method has been widely used in this country. It is also of value at times to perform the same office for cerebral or cerebellar cysts. Kahn uses about 5 c.c. of thorotrast.

REFERENCES.—¹*Surg. Gynec. Obstet.* 1942, **75**, 465; ²*Proc. R. Soc. Med.* 1943, **36**, 403.

BREAST, SURGERY OF.

Lambert Rogers, M.Sc., F.R.C.S.

Lesions of the Male Breast.—R. W. Scarff and C. P. Smith,¹ from a study of 65 specimens removed at operation, found chronic mastitis to be the lesion in 41. In the male, chronic mastitis accounts for more than twice as many cases as does carcinoma. The reverse holds in the case of women, in whom carcinoma is more than twice as common as chronic mastitis in the amputated specimens which come for investigation. In only 3 of the male cases of chronic mastitis was there a degree of epithelial proliferation sufficient to give rise to serious apprehension of possible malignancy. Of these 3 specimens, 2 were from patients who had been handling stilbœstrol or its precursors for 12 and 10 weeks respectively. Tenderness and enlargement of the breasts were noticed 3 to 4 weeks after beginning the work and persisted until it was discontinued, after which symptoms gradually subsided. The authors of this paper point out that C. W. Dunn in 1940 described gynæcomastia following stilbœstrol therapy. [Enlargement and tenderness of the breasts may be troublesome when this hormone is given to patients with prostatic carcinoma.—L. C. R.]

Carcinoma.—From a study of 3535 cases, F. E. Adair² of the Memorial Hospital, New York, concludes that the most satisfactory method of treatment is immediate radical amputation combined with post-operative irradiation. In his series so treated 76.8 per cent of patients with no axillary involvement were alive at the end of 5 years and 41.8 of those whose axillary glands were already involved at the time of operation; 695 of a total of 1383 patients with various stages and types of the disease were alive at the end of 5 years (51 per cent). Adair makes the point that irradiation carefully applied after operation has greatly

improved the outlook for the more highly malignant types (Grades 3 and 4), involving the axilla. [While the 76 per cent referred to above agrees well with that of other clinics, both in this country and elsewhere, the 41.8 per cent for patients whose axillary glands are already involved is a higher figure than is usually claimed; about 25 per cent being the five-year survival rate reported from most clinics.—L. C. R.]

C. D. Hagensen,³ from the Presbyterian Hospital, New York, found that 22.8 per cent of 640 patients who had had radical mastectomy performed had developed recurrence within 5 years. Studying the type of amputation performed the author of this paper believes that better results were obtained from the more radical operation which there was an increasing tendency to perform in more recent years.

Edema of the Arm following Radical Mastectomy for Carcinoma.—This question was last discussed in the MEDICAL ANNUAL for 1941, p. 54. (See also MEDICAL ANNUAL, 1938, p. 72.) Many attempts have been made to explain the edema, which has been variously ascribed to post-operative inflammation, venous obstruction, fibrosis due to irradiation or occurring naturally in the dead space left in the axilla, and to recurrence of malignant disease. The question has again been discussed by S. Standard of New York,⁴ who concludes that the weight of evidence is in favour of the condition being due to lymphatic obstruction and therefore a true lymphœdema. Prophylactic efforts are indicated to obviate or minimize the condition, and these include gentle and careful operative technique, the use of a minimal amount of non-irritating ligature and suture material, and the preservation as far as possible of venous channels. Only light artery forceps should be used on tributaries of the axillary vein, and those tributaries should be tied with the finest of ligature material close to the main vein, but not sufficiently close to constrict its lumen because venous obstruction is apparently a contributing factor in some cases. [A further prophylactic measure is probably the preservation of a part at least of the lymphatic drainage of the arm, namely, that part which follows the course of the cephalic vein through the delto-pectoral furrow, in which are found one or two lymphatic glands from which efferents cross the clavicle to enter the glands of the posterior triangle of the neck. In extending the incision outwards across the tendon of the pectoralis major to open up the axilla, it may be well to bear this in mind.—L. C. R.]

TREATMENT.—Conservative measures as suggested by E. A. Devenish and W. A. G. Jessop⁵—namely, elevation of the limb and the wearing of a light corset around it—may be effective, particularly in milder cases, but where these fail and in the grosser examples more radical treatment is called for and in the past the swollen limb has frequently been amputated because of its weight and discomfort. Standard⁴ has practised a successful alternative in a case in which the patient had asked for relief by amputation. He anastomosed the grossly enlarged upper arm to the chest wall, which was thus used to furnish a collateral lymphatic flow. An oval segment of skin and deep fascia was excised on the inner aspect of the arm and bare muscles were exposed; the serratus magnus was then exposed through an incision on the outer aspect of the chest and the skin edges of the arm and chest wounds were united by interrupted skin sutures. The arm now remains loosely fixed to the chest wall, but what the patient has sacrificed in abduction at the shoulder she has gained in usefulness of the hand as the swelling has been reduced very considerably (Plate F). [Rather than amputate in such cases this procedure would appear well worthy of further trial.—L. C. R.]

REFERENCES.—¹*Brit. J. Surg.* 1942, **29**, 393; ²*J. Amer. med. Ass.* 1943, **121**, 553; ³*Ann. Surg.* 1942, **116**, 801; ⁴*Ibid.* 810; ⁵*Brit. J. Surg.* 1939, **25**, 261.

PLATE V
LYMPHŒDEMA OF ARM AFTER MASTECTOMY
(S. STANDARD.)

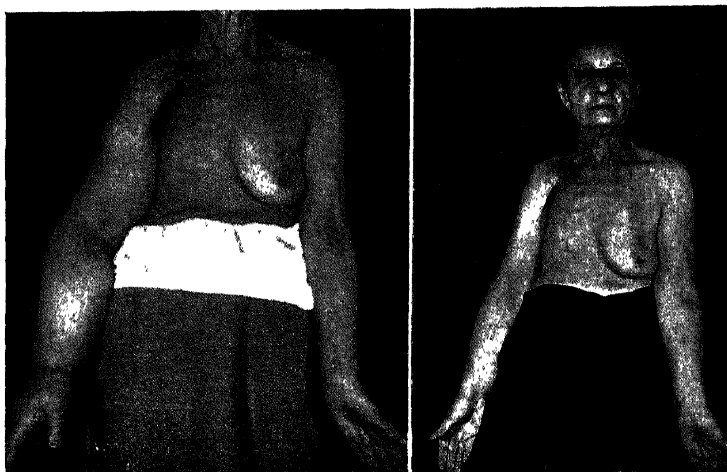


Fig. A.—Arm nine years after mastectomy for carcinoma of breast.

Fig. B.—Arm twelve months after operation.



Fig. C.—Demonstrating mobility of hand with arm fixed to chest wall. Elbow, wrist, and finger motion free.

Reproduced from the 'Annals of Surgery'

BRITISH PHARMACOPŒIA 1932: SIXTH ADDENDUM.*

R. St. A. Heathcote, D.M., F.R.C.P.

War conditions have again led to certain changes being made, several of minor and one of major importance. Among the former may be mentioned the omission of quinine from Baston's Syrup. The major change affects the Ointments. For these, a new base has been devised, the mixed alcohols obtained from the esters which make up wool fat. This contains nearly 30 per cent of cholesterol and is extremely potent as an emulgent for the preparation of water-in-oil emulsions. By the use of this substance it has proved possible to economize about half the weight of ointment base by replacement with water. How far this will meet with the approval of the dermatologists it will be interesting to see. That a certain degree of doubt exists is clear from the fact that the *Addendum* includes Zinc Oxide Ointment in two forms, the new with, and the old without, the water content. Further, to economize lard, the old established formula for Ung. Hydrarg. has been replaced by that of the current U.S.P. While doubtless this will be equally as effective as the old, it is possible that such properties as, e.g., the rate of absorption of mercury, will be altered, and practitioners will have to find out for themselves how far such possible changes may affect their use of it.

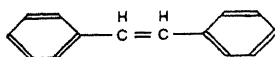
For certain well-established drugs, new monographs have been written. In general, the manufacturer, rather than the practitioner, will be affected by these changes. Thus, in Ipecacuanha the proportion of non-phenolic to total alkaloids has been slightly reduced. A new method of assay has been introduced for the two salts of Mepacrine. Practitioners may note that the alkaloidal content of Ergot has been doubled, from 0.1 to 0.2 per cent, with a corresponding reduction in dose. A new monograph has been inserted to cover Kaolin for internal administration, in which a very light form is desirable, while the heavy form is retained for use as the official poultice, Cataplasma Kaolini, only.

Probably the additions will be of more general interest. Thus, in the group of the Vitamins, several new members appear. Two synthetic substitutes for Vitamin K, concerned with prothrombin levels in the blood, have been inserted. Of these, one, Menadione, 2-methyl-1:4-naphthaquinone, is practically insoluble in water and is intended for intramuscular injection, probably best as a solution in a fixed oil; the other, Acetomenaphthone, the diacetyl-derivative of Menadione, is for oral use. To ensure its absorption from the intestine, especially in cases of obstructive jaundice, combination with bile-salts in some form will be advisable. While Nicotinic Acid has been official since 1941, its amide is now included. It is in this form that the pyridine ring occurs in co-enzyme, though in treatment the acid and its amide appear to be equally effective. The latter is, however, very much more soluble in water and this probably accounts for its insertion. The yellow respiratory pigment of Warburg contains Riboflavin (Lactoflavin, Vitamin B₂ or G). The exact results of a deficiency of this in the dietary of man or animals do not appear to be very accurately known, but there is evidence that such a lack may be associated with certain ocular defects, diminished visual acuity, keratitis, etc.

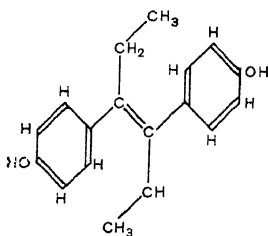
Of the female sex hormones, the oestrogenic has been used with considerable success, notably in the treatment of menopausal conditions, and, with perhaps less constant results, in various vaginal affections. The cost of the naturally occurring hormone has been very great and this has no doubt militated against its wider use. It has been found that synthetic derivatives of stilbene (diphenylethylene) possess apparently exactly the same actions and can be prepared far

* Official from Aug. 1, 1943.

more cheaply. The most powerful of these, 4:4'-dihydroxy- α : β -diethylstilbene, Stilbæstrol, appears in the present *Addendum*. Overdosage may lead to very marked vomiting, but generally toxic effects are not caused by it, though exfoliative dermatitis has been recorded.

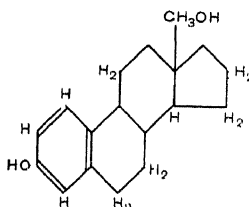


Stilbene



Stilbæstrol

(4:4'-Dihydroxy- α : β -diethylstilbene)



Œstradiol

(naturally occurring œstrogenic hormone)

Araroba, the source of the mixture of compounds called Chrysarobin, is imported from Brazil and is in somewhat short supply. For some years now, a close chemical relative of the most important constituent of Chrysarobin has been used as a substitute. This is Dihydroxyanthranol, known commercially as Cignolin, Anthralin, etc., and now made official under the name Dithranol. It has certain advantages over Chrysarobin, in that: (1) it is a pure chemical compound which can be synthesized here; (2) it is as effective as Chrysarobin but less irritant to the skin and kidneys; and (3) it is much less liable to cause staining of the clothing, etc. There is an official Ointment, of a strength of 1-1000, and treatment should start with this, the strength being gradually raised if necessary to 1-200.

It is interesting to note the appearance of an official antiseptic solution, Liq. Chloroxynolis, which is the counterpart of a well-known proprietary preparation, introduced originally for use in obstetrics especially. There is every reason to expect that the official preparation will be equally as effective as the proprietary. The present writer believes that for the first time the Pharmacopœia Commission has coined a special name for a compound preparation, as the official Liquor has an official synonym, Roxenol.

BRONCHIAL TREE, ANATOMY OF.

Maurice Davidson, M.D., F.R.C.P.

Until the last few years but little attention has been paid to the detailed anatomy of the bronchial tree, which had no great significance in relation to the diagnosis and treatment of diseases of the chest until the development of modern thoracic surgery compelled a revision of our knowledge of applied anatomy. The late H. P. Nelson,¹ whose work on the postural drainage of the lungs must be regarded as perhaps the first pioneer effort in this direction, gave a stimulus to accurate investigation of the bronchial supply of different areas of the lungs, and this was further elucidated by the information supplied by bronchoscopic examination and by the study of bronchograms. A. F. Foster-Carter² has lately published an account of the anatomy of the bronchial tree, with a nomenclature of its various divisions, which is likely to be accepted as

a standard basis for that accurate localization which is a necessary preliminary to the adequate treatment of such conditions as bronchiectasis and lung abscess. His thesis begins with a short account of the embryology and comparative anatomy of the lungs and bronchi; this is followed by a historical survey of the different accounts of their anatomy and of the nomenclature adopted by various authors. In his own investigations he has used the methods of dissection, of the making of casts, of the introduction of dyes, etc., into the bronchi, and of the study of bronchograms. The article is profusely illustrated by photographs, radiographs, and diagrams, with drawings of the various orifices seen on bronchoscopic examination. This is the most comprehensive and accurate account of the subject with which we are acquainted; it is likely to be accepted as a standard work in applied anatomy. A further account by Foster-Carter³ has appeared in which in addition to an abridged review of the former work there is a series of photographs illustrating the application of this detailed knowledge to the problem of postural drainage of the various pulmonary segments. The correct position of the patient for drainage of each area is clearly shown, the appropriate portions of the bronchial tree being diagrammatically outlined on the chest in each photograph of the model.

REFERENCES.—¹*Brit. med. J.* 1934, 2, 251; ²*Brit. J. Tuberc.* 1942 36, 19; ³*Proc. R. Soc. Med.* 1943, 36, 451.

BURNS OF WAR.

Cecil P. G. Wakeley, C.B., D.Sc., F.R.C.S.

There seems to be a definite tendency among the surgeons who are dealing with war burns to eliminate tannic acid entirely as a form of treatment. However, coagulants such as triple dye, gentian violet, and Bonney's blue are still extensively used as a first-aid measure in the Royal Navy, where many cases of burns occur in small ships not carrying a medical officer.

All through the present war, the majority of burns in the three fighting services involve the hands and the face, and these are the major problems to be dealt with. In the last war, numerous new forms of treatment for burns came into vogue and were soon eliminated as unsuitable; so in this campaign, many new forms of treatment have been advocated but have not stood up to prolonged clinical trial.

There are two essentials in the treatment of war burns and they are of paramount importance: (1) The elimination of sepsis; (2) The early skin-grafting of deep burns. These two important facts were pointed out repeatedly during the last war, but it has taken over four years of this war for medical officers to appreciate them. Any form of burn treatment which will prevent infection is justifiable, and it is essential that the treatment should not prevent early skin-grafting in cases of deep-burn injury.

There is still a tendency to treat the burn and not the shocked condition of the patient, and valuable lives are still being lost each year due to this cause alone. *It is imperative that no treatment to the burnt area should be given until the shock has been efficiently treated.*

Burn Shock.—In war burns, shock may be complicated by pulmonary damage. Cope and Rhinelander,¹ who treated the casualties in the Cocoanut Grove disaster, in which pulmonary damage was common, found it necessary to modify intravenous plasma transfusion. An effort was made to diminish the oedema in the damaged lungs by allowing a mild amount of hæmoconcentration to persist. Adrenal cortical extract did not affect the pulmonary oedema or the general body function. [This is the experience of surgeons in this country who have had a large number of war burns under treatment.—C. P. G. W.]

Massive oedema, out of proportion to the surface area involved, may occur beneath deep burns of the face, and it is well to be prepared to give a blood

transfusion following a plasma transfusion in such cases. The clinical condition of the patient should be properly assessed and the surgeon should not be too influenced by various blood estimations.

Paraffin Wax Treatment.—In the first world war, paraffin wax in the form of ambrine was used extensively by the French for the treatment of burns. Lieutenant-Commander Pendleton,² of the United States Navy, advocates the paraffin wax open-air treatment in the present war. The wax has the following formula :—

Paraffin wax	670 g.
Petrolatum	250 g.
Liquid paraffin (heavy)	150 c.c.
Cod-liver oil	50 c.c.
Sulphanilamide powder	50 g.
Menthol	1 g.
Camphor	1 g.
Oil of eucalyptus	1 c.c.

The wax is melted on a water bath and poured into a spray gun. The burnt area is sprayed with a liquid wax; no cleansing or débridement is necessary before the application of the wax. It is claimed that the wax stops pain and minimizes shock. The broken skin, blisters, and dirt all separate after a few days, leaving a clean surface. If the burn is a deep one, skin-grafting is performed as soon as the wax separates. This method of treatment has given good results in the Navy of the United States. The treatment should be applicable to any part of the body, whether the burnt area is on the face, scalp, neck, genitalia, hands, or easily constricted areas like the arms and legs, or around the eyes, ears, lips, and nares. It is of value in any type of burn, whether due to flash, fire, or to scalding with water or oil.

Cod-liver Oil Treatment.—Callahan³ is of the opinion that burns can be effectively treated by free cleansing with soapy sterile water, débrided, dried, and covered with cod-liver oil ointment. The whole area is then covered with a single layer of paper tissue. Such a covering is non-adherent and can be easily changed.

Boric Acid Treatment.—Boric acid in the treatment of burns has again been revived; it is used as an ointment spread on gauze mesh. There is some experimental evidence for its recommendation. Cannon and Cope⁴ have performed a number of interesting experiments in this respect. They have found that the donor sites from which a skin-graft of uniform thickness has been cut with a dermatome offers a simple clinical medium for judging the effect of substances upon the healing of an epithelial wound. Various agents recommended for the treatment of a débrided burn surface were tested by applying them to the donor areas. Tannic acid, tannic acid and silver nitrate, gentian violet, triple dye, and sulphonamide ointments were all found to delay epithelial healing as compared with the control boric acid ointment.

Use of Sulphonamides.—Various of the sulphonamides have been advocated in the treatment of burns, but many more investigators are wanted to record their results before anything very definite can be stated on this matter. Vidas and McEachern⁵ found that in an oily base sulphanilamide remained in the base and very little went into solution with tissue fluid. Glover⁶ has confirmed this, and believes that ointments of this type are of little more value than an ointment of the base alone. If powdered sulphanilamide is used there is a great danger of poisoning, and deaths have been reported amongst the troops from its use. Again, in quite a considerable proportion of burn cases which are infected with streptococci, sulphanilamide-resistant cases have been met with at all burn centres. It appears that the value of sulphanilamide creams in the treatment of war burns is on the wane.

PLATE VI
 BURNS OF WAR
 (CAPT. P. G. WAKELEY)



Fig. A.—Abdominal burn. Body cylinder in position.



Fig. B.—Burn clean after 14 days' irrigation treatment.



Fig. C.—After 42 days' irrigation. Area grafted at this stage.



Fig. D.—16 days after graft. Burnt area now completely covered.

PLATE VII
 BURNS OF WAR—continued
 (CECIL P. G. WAKELEY)



Fig. E.—Burn of lower arm. Treated from outset by irrigation.



Fig. F.—After 10 days, burn clean and ready for grafting.



Fig. G.—Envelope applied to cover both grafted and donor area.

Penicillin in Burns.—There can be no doubt whatever that penicillin is more active than the sulphonamides in eliminating streptococci and staphylococci from the surface of infected burns. Penicillin also removes streptococci which are resistant to sulphonamides. Bodenham⁷ has used a penicillin cream base with great success at an R.A.F. burn centre. He has found that a cream base, formed with lanette wax and soft paraffin, and giving a concentration of 100 Oxford units per gramme, is the most effective and economical means of applying penicillin to burns. Applied every 24 hours, it will usually remove Gram-positive cocci from an infected raw surface within 4 to 6 days. However, it is unlikely that such a cream will be used as a first-aid dressing.

Irrigation Treatment.—Saline baths have been tried in many centres for the treatment of extensive burns, and on the whole have been found wanting because these burns are nearly always infective and saline only helps the process. However, the irrigation of infected burns by means of electrolytic sodium hypochlorite (Milton) within an envelope is a sound surgical procedure. Milton is an excellent antiseptic and infection rapidly clears up. The treatment is cheap and foolproof, and concentrated Milton can be diluted with tap water to form a 1 per cent solution of electrolytic sodium hypochlorite. The envelope method does not require any change of dressings, which is a very important factor in patients who have lost their morale and are terrified of the next dressing.

Envelopes are now made for any part of the body, but it is the extremities that are so frequently injured in war burns. *Plate VI* gives a good idea of how an abdominal burn can be treated by a silk cylinder. This was a third degree burn which after 14 days was septic. A body cylinder envelope was applied after cleansing with 20 per cent Milton (*Fig. A*), and irrigations with 5 per cent Milton, thrice daily, were commenced. The patient was free from pain. After 14 days' irrigation the burn was clean (*Fig. B*). Epithelialization proceeded by means of peripheral invasion; *Fig. C* shows the area of fibro-plastic remaining after 42 days' irrigation. At this stage the area was grafted, and 16 days later it was completely covered (*Fig. D*). *Plate VII* reveals the benefit that results in using irrigation envelopes after skin grafting. This was a third degree burn of the lower arm which was treated from the outset by the irrigation envelope method (*Fig. E*). After 10 days the burn was clean and ready for grafting (*Fig. F*). A Thiersch graft from the donor area on the upper arm was used to cover the burnt area. An envelope was applied to cover both the grafted and the donor areas (*Fig. G*). Each area received individual treatment. Over the grafted area a compression pad was applied and left in position for 60 hours. At the end of this time the pad was removed and the graft found to have become established. Irrigations were commenced with 1 per cent Milton. The donor area (lying proximal to the compression pad in *Fig. G*) was treated as an open wound. Irrigations were commenced immediately. The point here is that the compression pad serves to exclude irrigating fluid from the area of the graft until the graft becomes firmly established. It is necessary in these cases to use firm pressure on the graft until this has taken place.

Hand envelopes containing sulphanilamide powder are now issued to the Royal Air Force and the Fleet Air Arm, for the use of burnt pilots, and have proved their worth. All the injured man has to do is to place the burnt hand inside the envelope and fasten it above the wrist. The blisters and sweat dissolve the powder, and the fluid so formed prevents infection.

For infected burns the irrigation envelope method is excellent; it is cheap, and in the Royal Navy the electrolytic sodium hypochlorite can be made from sea water quite easily.

Plaster-of-Paris Treatment.—Although this method is an old one it has been revived in this war by Barnes of Oxford.⁸ It has proved its worth in certain

cases, and allows for the easy and comfortable transport of the patient. It is, however, necessary that thorough cleansing of the burnt area should be performed and all dead tissue should be excised. The burnt area is covered with a layer of gauze or gauze impregnated with vaseline. Complete immobilization in plaster-of-Paris directly over the gauze is the aim of this treatment. For the hands it is necessary that the "position of function" should be established. This position, of slight dorsiflexion of the wrist, 60° flexion of the metacarpo-phalangeal joints, 45° flexion of the interphalangeal joints, and with the thumb opposed to the index finger, ensures maximal relaxation of the long muscles of the fingers. Such a dressing prevents cedema and does away with repeated dressings.

Burnt hands, treated in this way, do not become stiff from immobilization. Skin-grafting is required for deep burns treated in this manner.

Immediate Skin-grafting in the Treatment of Burns.—Early skin-grafting of complete-skin-loss burns is now established as essential treatment. Several surgeons have advocated the immediate cleansing and complete débridement of a deep burn, with immediate grafting and compression dressing over the grafts. Young⁹ has demonstrated many cases with excellent results.

In the Royal Navy a large number of electrical burns have been treated with excision of the burnt area and immediate skin-grafting, and the results have been most gratifying. This method is excellent if only one or two cases come under treatment, but could not possibly be carried out if a large number of burn casualties were admitted to hospital.

REFERENCES.—¹*Ann. Surg.* 1943, 117, 915; ²*J. Amer. med. Ass.* 1943, 122, 144; ³*Ibid.* 121, 541; ⁴*Ann. Surg.* 1943, 117, 85; ⁵*Med. J. Aust.* 1941, 2, 470; ⁶*Aust. N.Z. J. Surg.* 1942, 12, 2, 91; ⁷*Lancet*, 1943, 2, 725; ⁸*Brit. med. Jour.* 1943, 1, 408; ⁹*Ann. Surg.* 1942, 116, 445.

CANCERUM ORIS.

Lambert Rogers, M.Sc., F.R.C.S.

Cancerum oris is fortunately not often seen to-day, but war conditions may at any time bring it more to notice, especially among under-nourished refugee children. It is an infective gangrenous stomatitis, and affected children are always in a low state of health, often recovering from one of the acute exanthemata, especially measles. Bouillat and A. Ramiandrasca¹ have suggested that the condition is probably related to scurvy, and acting on this assumption they have treated 48 sufferers with large doses of vitamin C, the average dose being 500 mg. of ascorbic acid per day. They claim good results, remarking that whereas formerly 3 patients died for every one that recovered, in their series 3 recovered for every one that died. The gangrenous process was arrested, cachexia began to diminish, and rapid healing took place. These results would appear to show that there is at least a deficiency of available vitamin C in cancerum oris and that early administration of large quantities should be practised.

REFERENCE.—¹*Rev. Sci. méd. franc. Moyen-Orient*, 1942, 1, 51.

CARDIAC. (See also ARRHYTHMIA; ENDOCARDITIS; HEART.)

CARDIAC ANEURYSM.

William Evans, M.D., F.R.C.P.

There are no symptoms characteristic of aneurysm of the heart, although heart failure and angina pectoris are commonly associated. From a study of 13 cases J. H. Crawford¹ recorded the following signs as most characteristic in the diagnosis: (1) A history or cardiographic proof of cardiac infarction; (2) Abnormal pulsation, separated from the apex pulsation, and particularly when situated above the fifth rib; (3) A localized bulge or angulation of the left border of the heart at cardioscopy; (4) Localized pericardial adhesions or calcification of the aneurysmal wall.

REFERENCE.—¹*Arch intern. Med.* 1943, 71, 502.

CARDIAC INFARCTION. (*See also* ELECTROCARDIOGRAPHY.)

William Evans, M.D., F.R.C.P.

Prognosis.—H. W. Rathe¹ has evaluated the clinical symptoms and signs in 274 cases of cardiac infarction in relation to the prognosis. A poor prognosis was indicated when a sinus tachycardia of 100 persisted over five days, the age of the patient was over 55, the systolic blood-pressure dropped suddenly and failed to rise again to a level of 100 mm. of Hg within five days, congestive heart failure developed, gallop rhythm was present, and when the electrocardiogram indicated an indeterminate infarction.

A. M. Master, S. Dack, and H. L. Jaffe² conducted various function tests in 202 patients who were observed for two to eight years after cardiac infarction. The results were evaluated from a prognostic point of view. Recovery was found to be good or complete in one-third of the patients. A persistent reduction in vital capacity was rare in the good recovery group, but common in those whose recovery was poor. The vital capacity, however, was not infrequently normal in the presence of severe angina pectoris. The telerradiogram showed cardiac enlargement in half of the patients and the majority of these had hypertension. As a general rule coronary sclerosis or coronary occlusion did not produce cardiac enlargement unless hypertension or heart failure was present. Clinical recovery was more complete and subsequent anginal attacks were less common when the heart was normal in size. The electrocardiogram returned to normal or almost normal in one-fifth of the patients. Whether the infarct was situated anteriorly or posteriorly did not affect the clinical course.

R. M. Woods and A. R. Barnes³ examined the contributing factors which might have caused the death of 60 out of 128 patients with cardiac infarction within 6 weeks of the onset of the illness. The immediate mortality among patients over 60 was twice that of those under 60. The mortality was the same for those with anterior infarction and posterior infarction. The appearance of ventricular extrasystoles after the infarction proved to be an unfavourable sign, for patients in whom they became frequent were liable to ventricular tachycardia, and even fatal ventricular fibrillation. When a large septal infarct was present heart failure set in within a short time and progressed rapidly.

REFERENCES.—¹*J. Amer. med. Ass.* 1942, 120, 99; ²*Ibid.* 1271; ³*Amer. Heart J.* 1942, 24, 4.

CARDIAC PAIN.

William Evans, M.D., F.R.C.P.

Syphilitic Pain.—E. Jones and D. E. Bedford¹ have recorded the clinical findings in 103 syphilitic patients with paroxysmal pain in the chest. Aortic incompetence was present in 67. The electrocardiogram was abnormal in 57 out of 94 cases examined. Angina of effort was present in 76, and 64 had pain apart from effort. Nocturnal attacks were common and were usually independent of paroxysmal dyspnoea. They tended to be long, but they were relieved by nitrite. From 12 cases examined at necropsy they concluded that the essential lesions of syphilitic angina were aortitis and aortic incompetence, usually combined with stenosis or occlusion of the coronary ostia. Pathological evidence that uncomplicated aortitis causes anginal pain was lacking.

Phantom Limb.—Two cases in which angina pain was referred in part to a phantom left arm have been recorded by H. Cohen and H. W. Jones² as a contribution to the problem of referred pain. In both patients the left arm had been amputated more than 25 years before the onset of cardiac pain, and there was clinical and cardiographic evidence of myocardial damage in both. Anaesthetization of the brachial plexus of the phantom caused in one case abolition of the phantom component of the cardiac pain, and in the other significant delay in the appearance of the phantom component which led to a reversal of the site of onset and spread of the pain.

REFERENCES.—¹*Brit. Heart J.* 1943, 5, 107; ²*Ibid.* 87.

CEREBRAL ABSCESS. (*See* BRAIN ABSCESS.)**CEREBRAL DIPLEGIA.***Macdonald Critchley, M.D., F.R.C.P.*

R. M. Stewart's¹ presidential address to the Neurological Section of the Royal Society of Medicine is an important contribution to the subject of cerebral diplegia, and particularly to its pathology. The difficulties inherent in a study of this syndrome are peculiarly great. In the first place, a history of the case is often totally lacking, as may be also an account of the maternal health during the pregnancy and at the time of labour. Records as to the clinical condition during infancy are often not forthcoming; and lastly, careful examination of the diplegic child—including the fundus oculi—may be far from easy on account of a mental subnormality. Hence it is that many surveys of the diplegic state form a collection of mere diverse types and syndromes. The victims may have been affected at birth, or the diplegia may have developed later; slowly or suddenly. The spasticity may be stationary or progressive; universal or partial; hemiplegic, paraplegic, tetraplegic, or monoplegic in distribution. There is a varying degree of speech affection; the mental state may differ widely. Fundus changes may or may not occur. Epileptic fits may be a prominent feature, or they may not occur at all. There may or may not be a familial incidence. Inconsistencies of this sort are very apparent when one studies the reviews made by J. Collier,² B. Sachs,³ and R. S. Frew,⁴ for example. Until about 1924, physicians more or less accepted without question S. MacNutt's^{5, 6} conception of diplegia as the result of meningeal hæmorrhage at birth. Collier's thesis was that the essential cause of all cases of cerebral diplegia is a primary neuronal degeneration. The *causa causans* of this decay can be looked for in early foetal life, and no relationship exists with birth injury and meningeal hæmorrhage.

As Stewart says, it is not disputed that subarachnoid hæmorrhage is frequent in infants' brains. About 12 per cent of all newborn infants exhibit blood in the cerebrospinal fluid, but such cases do not develop diplegia. F. R. Ford⁷ wrote in 1926 that he was unable to find a single case of true cerebral diplegia in which intracranial bleeding at birth could be established. Frew recorded two babies who lived a fortnight after extensive cortical hæmorrhage, but the clinical state of the infants was quite unlike that of a diplegia. It is probable, however, that intracranial hæmorrhage is responsible for a certain number of cases of infantile spastic palsy, though not necessarily of cerebral diplegia. H. Roberts⁸ followed up 66 cases of birth injury with intracranial hæmorrhage; of these 40 developed quite normally; 9 would be regarded as cases of spastic paralysis with mental defect; and 4 showed motor disturbance only.

The occurrence of extravasations of blood in microscopical amounts has been described within recent years. Petechial hæmorrhages and minute areas of cerebral necrosis were reported by P. Schwartz⁹ in children either stillborn, or dying within the first six months of life. C. A. Potter and B. J. Alpers¹⁰ found petechial hæmorrhage in 26 out of 30 infantile brains. The authors believed that the bleeding occurred before birth and without any relationship to injury. As a result of the hæmorrhage myelinization of the tracts never developed normally.

This view raises again the question of prematurity, myelinization, and subsequent motor and mental development. Stewart points out, however, that the immense majority of premature infants do not suffer from paralysis, and furthermore that the proportion of diplegic infants born prematurely is not large.

The question of asphyxia and diplegia requires close attention. This idea also brings up the role of nitrous oxide anæsthesia, and of barbiturates during labour—the former of which has been regarded as risky by C. B. Courville,¹¹ and the latter by F. Schreiber.¹² Statements of this kind require much further

confirmation. H. K. Faber¹³ has spoken of the possibility of anoxæmia occurring early in foetal life, from interference with the foeto-maternal circulation. Among the possible influences which Faber mentions are placental separation, placenta prævia, attempts at abortion, toxæmias of pregnancy, and syphilis. (Pneumonia occurring during pregnancy was noted in one case of infantile cerebral atrophy recorded by Frew.)

With regard to the morbid anatomy of his own series of 50 fatal cases, Stewart tabulated the macroscopic appearances as follows:—

Normal appearance	9	Cerebellar atrophy	3
Atrophic lobar sclerosis	6	Developmental anomalies	1
Microcephaly	16	Optic atrophy	2
Micro-hydrocephaly	3	Small pyramids	12
Cortical atrophy without obvious sclerosis	12	Thickening and opacity of pia-arachnoid on vertex	13
Marked abnormal convolutional pattern	13		

Microscopic features did not always include a pyramidal degeneration, for in 4 cases no abnormality whatever could be found in the cortico-spinal pathways. In 5 cases only was it possible to demonstrate changes in these pathways throughout their extent. Other cases revealed degeneration only at certain levels. With pyramidal degeneration went astrocytic gliosis—a finding which argues against the idea of a primary arrest of myelinization in cerebral diplegia. Cerebellar changes occurred in 38 out of the 50 cases, a proportion which seems surprisingly great. The chief changes were:—

Gross atrophy of all layers	8
Total or marked loss of Purkinje cells	7
Moderate loss	3
Slight loss	9
Proliferation of Bergmann's glial cells only	9

Stewart regards his pathological findings as suggestive of a cerebral anoxæmia operating at or before birth. He is less convincing when he seeks to draw an analogy with the cerebral manifestations of an avitaminosis. Finally, Stewart refers to the condition of swayback in lambs—with its cortical nerve-cell degeneration, its demyelination, and its gliosis—and he mentions that the diplegic infant's brain described by N. W. Winkelman and M. T. Moore,¹⁴ provides an almost perfect human analogy to swayback.

REFERENCES.—¹*Proc. R. Soc. Med.* 1942, **36**, 25; ²*Brain*, 1924, **47**, 1; ³*Amer. J. med. Sci.* 1926, **171**, 376; ⁴*Disease in Childhood*, 1936, London; ⁵*Amer. J. med. Sci.* 1885, **89**, 58; ⁶*Arch. Pediat.* 1885, **2**, 20; ⁷*Medicine*, 1926, **5**, 121; ⁸*J. Amer. med. Ass.* 1939, **113**, 280; ⁹*Z. ges. Neurol. Psychiat.* 1924, **40**, 263; ¹⁰*Amer. J. Psychiat.* 1933, **12**, 751; ¹¹*Ann. Surg.* 1938, **107**, 371; ¹²*J. Amer. med. Ass.* 1938, **111**, 1263; ¹³*J. Mich. med. Soc.* 1942, **41**, 221; ¹⁴*Arch. Neurol. Psychiat.* 1942, **48**, 54.

CEREBROSPINAL FEVER.

II. Stanley Banks, M.A., M.D., M.R.C.P., D.P.H.

Epidemiology.—The war-time outbreak of cerebrospinal fever continued with gradually diminishing force throughout 1942 and in 1943. Notifications in the years 1939–42 were respectively 1500, 12,767, 11,073, and 6029, and deaths 517, 2584, 2163, and 1206. The ratio of deaths to notifications was 34 per cent in 1939, and approximately 20 per cent in each of the three years 1940–42.¹ These figures are believed to be an accurate measure of the effect of sulphonamide treatment of this disease, for the average ratio of deaths to notifications in the pre-sulphonamide years 1934–37 was 67 per cent. W. J. Martin² has estimated that 10,000 lives were saved by these drugs from this disease alone in 1939–41, and P. Stocks³ that 2500 lives were similarly saved in 1942.

Adrenal Syndromes and Lesions.—H. S. Banks and J. E. McCartney³ supplement their paper on “Meningococcal Encephalitis”⁴ (see MEDICAL ANNUAL, 1943, p. 75) with a description of certain clinico-pathological syndromes relating

to the adrenals, and also of various pathological lesions found in the adrenals in meningococcal infection. Encephalitic and adrenal lesions may be present separately or in combination in any case, and this gives rise to certain distinct clinico-pathological syndromes. Three encephalitic syndromes have already been described: (1) fulminating encephalitis; (2) acute diffuse or regional encephalo-meningitis; and (3) acute focal encephalitis. The first two of these are associated clinically with persistent deep coma, cyanosis, and stertorous or irregular breathing, and usually end fatally without recovery of consciousness notwithstanding the use of chemotherapy. The pathological changes corresponding with this state consist of congestion and oedema, capillary thrombosis and hæmorrhages of the brain-stem, followed later by inflammatory polymorph cuffing around the vessels of various parts of the central nervous system, and also, of course, by meningitis. The third syndrome (focal) is associated clinically with unexpected convulsions, coma, or sudden death in what seems an ordinary meningeal case, and the parenchymatous conditions described may in such cases be found in and around the medulla. Some cases show adrenal lesions in addition to encephalitis. The adrenal changes and the symptoms associated with them are discussed in the present paper.

The association of a fulminating septicæmia with bilateral hæmorrhage and circulatory failure has become popularly known as the Waterhouse-Friderichsen syndrome. The authors point out that there is no valid reason for the retention of this terminology since it includes two different clinico-pathological syndromes, the pure adrenal and the mixed or encephalitic-adrenal syndrome. These two syndromes have in common the sudden onset with fulminating septicæmia and purpura, very low blood-pressure, imperceptible pulse, and usually cyanosis. The clinical difference is that in the pure adrenal syndrome the mental condition usually remains clear to the end, whereas in the mixed adrenal syndrome there is early coma which persists and deepens. In the former, also, respiration is either normal or there is gulping dyspnoea of the air-hunger type, whereas in the latter there is rapid stertorous breathing which may finally assume the Cheyne-Stokes form. Eleven cases are described. Seven were of the pure adrenal syndrome and four of these were fatal and three recovered. Four cases were of the mixed syndrome, all of which were fatal. The pathological lesions found in the adrenals were varied in character. They consisted not only of pure hæmorrhage (hitherto by far the best recognized) but also of thrombotic necrosis with peripheral hæmorrhage, gross oedema without hæmorrhage but with areas of polymorph infiltration, and combinations of these lesions. The lesions were all extensive, involving medulla and adjacent parts of the cortex; sometimes the remaining cortical cells were definitely disarranged by the pressure. These lesions are illustrated by microphotographs. The three cases which recovered were assumed from the symptomatology to be examples of the pure adrenal syndrome. Their recovery was believed to be due to immediate and active treatment with sulphathiazole together with adrenal replacement therapy and adequate saline and glucose during the critical period. For this purpose both adrenal cortical extract and desoxycorticosterone acetate were used and the intravenous or intraperitoneal routes had to be employed for the saline and glucose.

J. E. Morrison⁵ describes autopsies on three young children who died after a fulminating illness of some 12 hours' duration and were found to have extensive bilateral adrenal hæmorrhage. There was noted, in addition, widespread oedema of the interstitial tissues, oedema fluid in the lung alveoli, sequestration of red blood cells in dense aggregates in over-distended minute blood-vessels, slight swelling of endothelial cells, and some minute hæmorrhages throughout the body. These lesions are essentially similar to those of surgical shock and

are such as would result from loss of plasma through damaged capillary walls. He suggests that these generalized structural changes may be the result of peripheral vascular failure produced by a bacterial toxæmia, rather than the result of shock secondary to the destruction of the adrenals. He points out that animals survive total loss of adrenals for several days at least. The practical value of this paper lies in Morrison's final suggestion that plasma transfusion is indicated in the therapy of many fulminant bacterial infections. Adrenal substitution therapy may be valuable but should be regarded as secondary. [This is a valuable hint for treatment. The practical difficulty of applying it in time to infants and small children in such a rapidly fatal illness as meningococcal septicæmia with purpura and low blood-pressure remains.—H. S. B.]

Relapse in Meningococcal Disease.—A. B. Christie⁶ describes a relapse in a man of 40 whose primary attack of meningitis was treated with sulphapyridine to a total of 25 g. in rather less than 4 days. He appeared to recover completely and was discharged from hospital after 14 days. About 5 months later he complained of chills and pains and later on two occasions had a faint pink macular rash on trunk and limbs. There was no neck rigidity and Kernig's sign was negative. Nevertheless, lumbar puncture released thick purulent fluid. The condition rapidly cleared up under sulphathiazole treatment to a total of 32 g. Christie considers that apparent clinical cure should be verified by lumbar puncture, and cites another case in which the spinal fluid contained a slight excess of cells and protein of 60–70 mg. per cent up to 3 months after the acute stage, although the individual concerned had no symptoms except some headache. [A final lumbar puncture just before discharge is a useful check on the effect of treatment. The cause of the relapse in the first case would appear to be too short a period of administration of the drug. The second case is quite a common type, is usually symptomless, and is not known to be associated with relapses or sequelæ.—H. S. B.]

Treatment.—Several valuable reviews of large series of sulphonamide-treated cases have been published. P. B. Beeson and E. Westerman⁷ analyse clinical data from 3575 case-reports submitted to the Ministry of Health from many hospitals in England and Wales. The vast majority of the cases were treated with *sulphapyridine*. They attempt to evaluate statistically the effect of Banks's schedule of dosage, which was adopted by the Ministry in their Memorandum (1940), as compared with that of smaller dosage during the first 24 hours of treatment in hospital. On this purely statistical basis it could not be shown that the results of the higher dosage were better. The authors remark, however, that there were some few fatal cases when the amount of the drug given was less than one-half that recommended by Banks, and it may be that a greater quantity would have turned the scale. Quite a clear-cut result was obtained on the question of combined serum and sulphonamide treatment. In nearly every age-group the results of combined drug and serum were *less* satisfactory than those of the drug alone. While this may have been, in part, due to the administration of serum to more severe cases, there is, nevertheless, no indication from this study that serum as an adjuvant to chemotherapy is beneficial. The tables and diagrams of age distribution, fatality-rates at various ages in males and females, and the list of complications in non-fatal cases constitute a valuable record. Over 76 per cent of the cases occurred during the first six months of 1940, when the disease was very severe, yet the fatality-rate at all ages for cases treated with sulphonamide alone was 14·3 per cent.

A. A. Jubb⁸ on behalf of the Ministry analysed much the same material — 3206 case reports. In a significant number of cases the meningococcus was typed, and 90 per cent were of Group I and 10 per cent of Group II. The latter cases equalled those of Group I in severity and actually exceeded them in

fatality. [In explanation of this apparent anomaly it might be pointed out that the percentage of Group II cases is much higher than the average in the two age-groups which are notoriously the most fatal, namely, infancy and over 65 years.—H. S. B.]

G. E. Harries⁹ reports on 500 cases treated in Cardiff Isolation Hospital. At all age-groups the gross fatality-rate was 8·6 per cent. In infants under 1 year, there were 41 cases with 6 deaths, a fatality-rate of 14·6 per cent. After infancy, fatality diminished with age to the most favourable age-group, 15–25 years (104 cases and 1 death). Cultures from 214 cases showed 93 per cent Group I, 3·7 per cent Group II, and 3·3 per cent inagglutinable. Clinically the various strains seemed to be of equal virulence.

A. Joe¹⁰ reports on 500 cases treated by sulphapyridine in Edinburgh. Case fatality-rates in this series were considerably higher than in Cardiff or elsewhere in England and Wales as a whole. At all ages the gross fatality-rate was 18 per cent; at 0–1 year 27 per cent; at 1–4 years 27 per cent; at 10–19 years nil (100 cases); at 40–50 years 53 per cent; and at 50+ years 58 per cent. Case-fatality increased, according to the day of disease on which chemotherapy commenced, up to the 4th day, but when treatment was commenced on the 5th day the fatality was little greater than that of cases treated on the 1st day. This is probably due to the fifth-day group being milder cases. Permanent nerve deafness amounted only to 1 per cent—a low figure. Neuritis occurred in 1·8 per cent, and two cases (drop-foot and ulnar nerve) had prolonged disability. One case of irido-choroiditis completely cleared up. Two relapses occurred—a very low figure compared with that of the pre-sulphonamide period. Toxic effects of the drug were relatively common, drug rashes (7 per cent), drug fever, nausea and vomiting, marked mental depression, and sterile abscesses from intramuscular injection. The drug used was sulphapyridine and the routine duration of administration 10 days.

T. H. White,¹¹ in a record of 288 cases amongst natives in E. Africa, strikes a different note reminiscent of the amazing work of Bryant and Fairman, and of Somers in 1939 in the Sudan. Sulphapyridine in 10 per cent suspension of the tablets in normal saline was injected intramuscularly, one dose daily of $\frac{1}{2}$ –1 g. according to age for 6 or 7 days. The average total dose varied from the relatively minute amount of 2·73 g. for infants to 8·43 g. for adults. In 45 patients it was necessary to repeat the course. The gross fatality-rate at all ages was 14·2 per cent, but, curiously, it varied little according to age. An important point is made in regard to epidemiology of the disease in Africa. Meningitis occurs mainly in the dry season and ceases soon after the onset of the rains. It may be remembered that Corkill put forward the rather startling theory that susceptibility to meningitis in the Sudan was associated with heavy ultra-violet irradiation. White gives evidence, however, that it was correlated with dusty conditions, and, in particular with the incidence of pharyngitis sicca, which is always highest in the long dry season, and lowest at the end of long rains.

[This paper confirms the Sudan workers' finding that remarkable results can be achieved in this disease by relatively minute doses of sulphonamide, at least in African natives. The data, however, suggest rather frequent relapses.—H. S. B.]

M. Taranto¹² describes 100 consecutive cases at a U.S. naval camp. He found *sulphadiazine* of inestimable value because of ease of administration, relative non-toxicity, and prompt therapeutic action. Ordinary cases had 2 g.; 2 g.; and then 1 g. four-hourly until the temperature had been normal for 72 hours; thereafter 1 g. three times daily. Delirious, comatose, or critically ill cases and those unable to tolerate the drug by mouth received 5 g. intravenously

on admission. The mortality of 1 per cent is considered to be unprecedented in the treatment of this disease. [Several large series in Service cases without mortality have been reported in this country.—H. S. B.]

REFERENCES.—¹*Lancet*, 1943, **1**, 674; ²*Brit. med. J.* 1942, **2**, 540; ³*Lancet*, 1943, **1**, 771; ⁴*Ibid.* 1942, **1**, 219; ⁵*Ibid.* 1943, **1**, 800; ⁶*Ibid.* 1942, **2**, 641; ⁷*Brit. med. J.* 1943, **1**, 497; ⁸*Ibid.* 501; ⁹*Ibid.* 1942, **2**, 423; ¹⁰*Edinb. med. J.* 1942, **49**, 628; ¹¹*E. Afr. med. J.* 1942, **19**, 172; ¹²*U.S. Navy med. Bull.* 1934, **41**, 966.

CHANCROID.

T. Anxeyl-Davies, M.D., F.R.C.P.

Prophylaxis.—Chancroidal ulcers were produced experimentally in 19 volunteers by R. B. Greenblatt, E. S. Sanderson, F. Mortara, and H. S. Kupperman¹ by scarifying the skin and applying one to two drops of an inoculum from 36- to 48-hour-old cultures of *H. Ducreyi*; 28 series of inoculations were performed in 170 scarified areas. The prophylactic use of castile soap and water, surgical soap-solution, calomel ointment, silver picrate jelly, and a mercurial antiseptic proved useless. Sulphathiazole administered orally, before and after inoculation, prevented experimental chancroid, but proved ineffective if, after cessation of therapy, 3-5 days were allowed to elapse before the inoculations were performed. Antibacterial agents (powdered sulphathiazole, sulphanilamide, sulphadiazine, sulphasuxadine) sprinkled over the inoculated areas proved effective. When a mixture of 20 to 33 per cent of a sulphonamide and 25 to 33 per cent of calomel was employed, successful prophylaxis resulted in 25 of the 34 inoculations.

Chancroid is apparently more resistant to prophylaxis than syphilis or gonorrhoea. Chemical prophylaxis in the U.S. army consists of initial cleansing of the genitalia with green soap, washing the parts with 1-1000 mercury bichloride, urethral injection of 5 per cent mild protein silver, and the application of mild mercurous chloride ointment. The rate of failure in gonorrhoea and syphilis was 0.8 per cent compared with 38 per cent failure for chancroid. In a series of 76 cases, a chancroidal lesion coincident with syphilis was found in 10 instances by E. Greenwald² (U.S. army). These cases presented no difficulty, as no adverse reaction marked the simultaneous use of sulphathiazole and daily full doses of marpharside. Routine therapy consisted of sulphathiazole in 4-g. daily doses, the initial dose being 2 g.; the doses were continued for a minimum of 7 days. No toxic reactions were encountered requiring withdrawal of the drug. The lesions were treated twice daily with soaks of 1-8000 pot. permang., followed by application of sulphanilamide powder. Under this treatment patients rapidly improved but there were six recurrences, four of which had received less than 7 days' treatment.

REFERENCES.—¹*Amer. J. Syph.* 1943, **27**, 30; ²*J. Amer. med. Ass.* 1943, **121**, 9.

CHEESE ITCH.

R. M. B. MacKenna, M.A., M.D., F.R.C.P.

G. B. Dowling¹ and E. W. Prosser Thomas² have drawn attention to a form of contact dermatitis affecting persons handling cheeses, the surface of which has become infested with mites of the Tyroglyphus family (*Tyroglyphus longior* var. *Castellani*, Hirst).

These mites are of world-wide distribution (the same mite causes copra itch), and it is believed that the cheeses attacked are those which have been a considerable time in store. The mites—which should not be confused with cheese maggots which bore into the cheese itself—form colonies on the outer surface of the cheeses where, as a result of their activities, a coating of fine powder forms. This coating, which may be a quarter of an inch in thickness, consists of layer upon layer of the dead bodies of mites, moulted skins, faeces, particles of cheese, and living mites themselves.

The history given by the majority of patients suffering from cheese itch is that they have noted a fine powdery dust coming from the cheeses, or from the crates containing the cheeses. Some hours later an acute, itching, erythematous dermatitis has developed on the exposed areas, namely, the faces, necks, and forearms. The eyelids usually are swollen during the attack. The hands may not be affected. It should be noted that the eruption is not caused by the mites burrowing into the skin, and that the rash does not suggest a parasitic cause, but is characteristic of dermatitis due to an irritant. Prosser Thomas suggests that the mites, or something in their debris, must behave as a fairly potent irritant of the primary rather than the sensitizer class.

TREATMENT.—The dermatitis subsides quickly under application of *calamine lotion* or *calamine liniment* if further exposure to the dust is avoided.

REFERENCES.—¹*Brit. med. J.* 1942, 2, 543; ²*Brit. J. Derm.* 1942, 54, 313.

CHEMOTHERAPY OF BACTERIAL INVASION: THE SULPHONAMIDES.

R. St. A. Heathcote, D.M., F.R.C.P.

During the past year no important extension of the use of these drugs seems to have been recorded, but much has been written in confirmation of their already established value. To-day sulphadiazine and sulphathiazole have, to a certain extent at any rate, ousted the older sulphanilamide and sulphapyridine, though the question of supply, especially in the case of the first-named, has somewhat limited their use in civilian practice in this country. This replacement of the older drugs is, in general, justified by their greater activity as judged both by experimental tests and by clinical experience. The question of their general toxicity in relation to their anti-bacterial efficiency must also be borne in mind, and, on this ground also, sulphadiazine and sulphathiazole are to be preferred to sulphapyridine and, though to a less extent, to sulphanilamide. The whole matter of toxic effects on the kidney will be discussed at the end of this article.

It has been argued¹, and the argument is supported by experimental results, obtained *in vitro*, that, on certain, to the reviewer abstruse, grounds of physical chemistry, no member of the sulphonamide group will be found to possess a higher degree of bacteriostatic activity than does sulphadiazine. This does not exclude, however, the possibility of new derivatives being prepared which may possess a higher ratio of therapeutic activity as compared with its toxicity, i.e., a higher therapeutic index. A full discussion of this matter would require more space than can possibly be allotted to it under present restrictions, and in consequence this article will be confined to a consideration of some of the more recently introduced members of the group, with a note on the causation and prevention of renal affections resulting from the use of the members of this group of drugs.

Sulphamethazine (Sulphamezathine) (2: 4'-aminobenzenesulphonyl-4: 6-dimethylpyrimidine).—Last year a résumé was given in these pages of the first two (clinical) papers dealing with this drug.² Since then a description of its activities, both pharmacological and antibacterial, has appeared.³ Its absorption and excretion, as compared with those of sulphanilamide and sulphapyridine, were determined in mice. On oral administration in equal dosage, the blood level of sulphamethazine attained a higher maximum than with either of the others, and this maximum was reached at a time slightly later than with sulphanilamide but considerably earlier than with sulphapyridine. Absorption from the gut, then, is almost as rapid as that of sulphanilamide and much faster than that of sulphapyridine. Again, after oral administration, the curve of the blood level of sulphamethazine was continually above that of sulphanilamide throughout the six hours of the experiment, thus proving its excretion rate to be less.

This is confirmed by the blood levels determined after intravenous administration of the three drugs in equal amount. In this respect, then, sulphamethazine resembles its parent, sulphadiazine.

To determine the acute toxicity of the three drugs, they were injected intravenously in mice. Little difference could be found between the three compounds in this respect. Similarly, the acute intravenous toxicity of the acetyl derivatives was determined. Contrary to the observations of Marshall and Litchfield,⁴ the acetylated sulphapyridine and sulphamethazine compounds proved less toxic, about two-thirds and one-half respectively, than the parent bodies, while there was little difference between sulphanilamide and acetylsulphanilamide. The acute toxicity on oral administration in mice was also examined. Owing to its very poor absorption from the gut, sulphapyridine proved by far the least toxic of the three. On the other hand, sulphamethazine, though at least as well absorbed as sulphanilamide, was found somewhat less toxic than it.

Attempts were made to assess the risk of renal damage by administering large oral doses, 1 g./kg./day, for 14 days to young rats. Animals killed at this time showed no renal lesions with either sulphamethazine or sulphapyridine. Others were given the same dose for 28 days. Two out of 6 rats so treated with sulphapyridine showed severe degenerative changes in the kidneys, pathologically similar to those described in man after treatment with sulphathiazole (see below). The rats given sulphamethazine and the 4 others given sulphapyridine showed no abnormalities in the kidney. The blood concentrations, and presumably also the risk of renal damage, were much higher with the former than with the latter drug. It does not seem that urolithiasis occurred in either group.

The same three drugs were used in *in vitro* experiments on *Str. pyogenes*, the pneumococcus, and on *B. friedlaenderi*. While these experiments are comparable *inter se*, as the conditions were kept the same, the absolute values obtained for bacteriostasis cannot be compared with those of other persons working under different conditions. Sulphamethazine and sulphapyridine proved about equally effective against *Str. pyogenes* and the pneumococcus, as did sulphanilamide against the former, though less active against the latter, organism. With *B. friedlaenderi*, sulphamethazine was appreciably more efficient than sulphapyridine, with sulphanilamide a bad third.

Mice infected with *Str. pyogenes* and pneumococci were used for experiments *in vivo*. Against both organisms, sulphamethazine and sulphapyridine proved, at each of three dose levels, about equally effective. Sulphanilamide, though nearly as useful as the others against the pneumococcus, was distinctly weaker in the case of the streptococcus.

Blood concentrations, etc., in man were investigated in patients undergoing treatment with sulphamethazine. The usual dosage employed was 4 g., followed by 2 g. six-hourly. Though some showed consistently high, and others low, blood levels, the usual amounts found were from 5 to 10 mg. per 100 c.c. of the free drug and rarely more than 5 mg. of the conjugated form. The urinary concentrations were very variable up to 1 per cent, with more than half as the acetyl derivative. In a few cases, more vigorous treatment was used, 2 g. four-hourly by mouth with intravenous or intramuscular injections of the sodium salt. (One case apparently moribund received 21 g. in 65 hours with recovery.) Blood levels in these cases often reached as much as 15 mg./100 c.c., and one of about 11 mg. was maintained for four days with no sign of toxic effects. The level in the cerebrospinal fluid of the free drug was of the order of 60 per cent of that in the blood. In three cases, in which the pleural fluid was examined, the concentration there was slightly higher than that in the blood. In none of 102 cases was there any clinical evidence of cyanosis, and in none of those with high blood concentrations was there evidence of the formation of

abnormal blood pigments. Urinary deposits when present were examined for sulphonamides but none was found (40 cases).

Generally, then, it may be said that sulphamethazine is readily absorbed and slowly excreted, permitting the maintenance of a relatively high blood concentration with doses smaller or less frequent than with most others of the group. *In vivo* and *in vitro* its activity seems comparable to that of sulphapyridine. No serious toxic effects have as yet been observed in man, and it seems probable that the risk of renal damage is less with it than with all other sulphonamides except sulphanilamide.

Two more clinical accounts of its use have appeared. In the first⁵ recovery was obtained in a case of pneumococcal meningitis in an elderly woman. Treatment was started early, probably on the second day, and 30 g. were given in 6 days. At this time cyanosis appeared and the drug was stopped. By then, however, the temperature had come down and the patient was well on the way to recovery. The second paper⁶ deals with a series of 77 cases of bronchopneumonia and of lobar pneumonia with 3 deaths. The drug was found to be well tolerated at all ages and to be free from toxic sequelae, especially in those of middle age and over. Of the 77 cases, 12 failed to respond to the drug. Of these, 6 in adults appeared to be cases of aberrant lobar pneumonia, and one in a child was probably a primary staphylococcal infection. It was, unfortunately, not possible to determine the blood concentrations of the drug, but, clinically, the authors thought that its effect became apparent more slowly than with sulphapyridine. They seem to be of the opinion that the drug will prove valuable.

Sulphamerizine (2 : 4' aminobenzenesulphonyl-4-methylpyrimidine).—A very extensive series of experiments has been reported by Welch and his colleagues⁷ in which sulphamerizine is compared with its parent, sulphadiazine, in such respects as absorption, excretion, and toxicity. Given orally as the sodium salts, the two drugs had about the same acute toxicity, about 2.5 g./kg. Sulphamerizine was given orally to rats for 30 days to the extent of 0.5 per cent in the food, but there was no evidence of interference with normal growth, etc. Dogs, which proved to be heavily infected with intestinal parasites, were given sulphamerizine in daily doses of from 0.4 to 1.6 g./kg. With the largest dose, evidence of liver destruction and of impaired hæmatopoietic activity was observed. On the lowest dose, no abnormalities were found, after 35 days.

From prolonged experiments on monkeys, it was found that the two drugs, compared on equivalent levels in the blood, are about equally toxic. As sulphadiazine is less well absorbed than sulphamerizine, it has to be given in considerably larger doses than the latter to obtain equal blood concentrations with the two drugs. Unless the average concentration in the blood at 8 hours after administration exceeded 30 mg./100 c.c., sulphamerizine produced no signs of toxicity or tissue damage. Above this level, tubular changes were found in the kidney and the bone-marrow was hyperplastic. Uroliths were only produced with very high blood concentrations.

In view of the fact that two methylated derivatives of the sulphonamide group, sulphamethylthiazole and uleron, seem particularly prone to produce peripheral neuritis in man and birds, this point was carefully examined in connection with sulphadiazine, mono-methyl sulphadiazine or sulphamerizine, dimethyl-sulphadiazine or sulphamethazine, and sulphamethylthiazole. Cockerels were used, and the dosage was from about 0.65 to 1.4 g./kg. except for sulphamethazine, 0.7 g./kg., owing to the exceedingly high blood levels attained with this drug. With sulphadiazine and with sulphamethylthiazole, all birds showed pathological changes in the sciatic nerve, and several, with the higher doses, in the spinal cord also. With sulphamethazine and sulphamerizine, injury to the sciatic

nerve was found in about half the birds. The risk of this type of toxic effect is then no greater with the methylated compounds than with the parent, sulphadiazine.

As with sulphamethazine, so with sulphamerizine, the higher blood concentrations, as compared with sulphadiazine on equivalent dosage, are due to more rapid and more complete absorption on the one hand, and to slower excretion on the other. This holds good in man as well as in experimental animals. This is of some degree of clinical importance in that, for a given blood level, less of the newer drugs need be administered and consequently there will be less to be excreted by the kidney and, therefore, less risk of urolithiasis.

Roblin and his collaborators⁸ confirm the observations as to the maximum blood levels reported by Welch, and similar results have been obtained in man by Goodwin, Peterson, and Finland,⁹ and by Murphy, Clark, and Flippin.¹⁰

Goodwin and his colleagues found that, *in vitro*, low concentrations of sulphamerizine were bacteriostatic to the pneumococcus Type III. Again, *in vivo*, Roblin and his colleagues⁸ found it to be more effective than sulphanilamide, sulphapyridine, or sulphathiazole in mice infected with streptococci, staphylococci, and pneumococci. They attributed its superiority chiefly to the higher blood levels attained with it as compared to the other drugs.

Hall and Spink¹¹ have reported the results of its use in the treatment of 116 patients. Of these the largest groups were: lung conditions 55, streptococcal infections 31, and staphylococcal disease 11. Of the first group, 32 were pneumococcal in origin, bronchopneumonia or lobar pneumonia, and of these 3 only died. The general effects of sulphamerizine in these cases resembled closely those of sulphadiazine. Again, in the group with streptococcal infections, sulphamerizine proved about equally as effective as sulphadiazine, but in staphylococcal sepsis better results were obtained with sulphathiazole. Recovery was obtained in 5 cases of meningitis, 3 due to the meningococcus and 2 to the influenza bacillus. As compared with sulphadiazine, smaller and less frequent doses were needed to keep up suitable drug levels in the blood. The usual dosage, e.g., in pneumonia, was 4 g. followed by 1 g. six-hourly. Larger doses were required in cerebrospinal meningitis, as much as 5 g. of the sodium salt being given intravenously with 1 g. by mouth three-hourly. The drug is regarded by these authors as being, at least, no more toxic than sulphadiazine. It caused less nausea and vomiting than sulphapyridine, and fewer cases of skin rashes or of drug fever were seen than would have been expected with sulphathiazole. One case of oliguria and one of anuria were seen, both yielding readily to treatment. Such events could almost certainly be prevented by rendering the urine alkaline and keeping up the fluid intake.

A comparison of the effects of sulphamerizine with those of sulphadiazine in meningococcal infections is made by Lipper, Sweet, and Dowling.¹² With the latter there were 10 deaths in 96 cases, of which 5 occurred within 24 hours from admission. With the former, out of 22 cases 2 died, neither within the first 24 hours from admission. Both series are small and little emphasis can be laid on the results. A few toxic effects were observed with sulphamerizine, one being a case of leucopenia. In the two series, the age distribution seems to have been approximately the same, but, as compared with other series published in this country, there seem to have been fewer infants, in whom prognosis is particularly bad. In this case, the age group 40 and over seems to have been the most serious. The authors conclude by saying that sulphadiazine is effective in the treatment of cerebrospinal fever and that sulphamerizine is apparently equally so.

Toxic Effects Involving the Urinary System. The first fatality of this nature due to any of the sulphonamides of which the present writer has knowledge

was reported by Tsao et al.,¹³ in which sulphapyridine had been employed. Since then, there have been many similar cases following the use of sulphapyridine, sulphathiazole, and sulphadiazine. In the majority of these there has been a formation of crystals, either of the free drug or of the acetyl derivative, either in the renal tubules or pelvis or in the ureter. Several factors are, or may be, concerned in determining whether or no such crystal formation will take place in any given case. Of these the most important are: the concentration of the drug in the blood; the degree of concentration of the glomerular

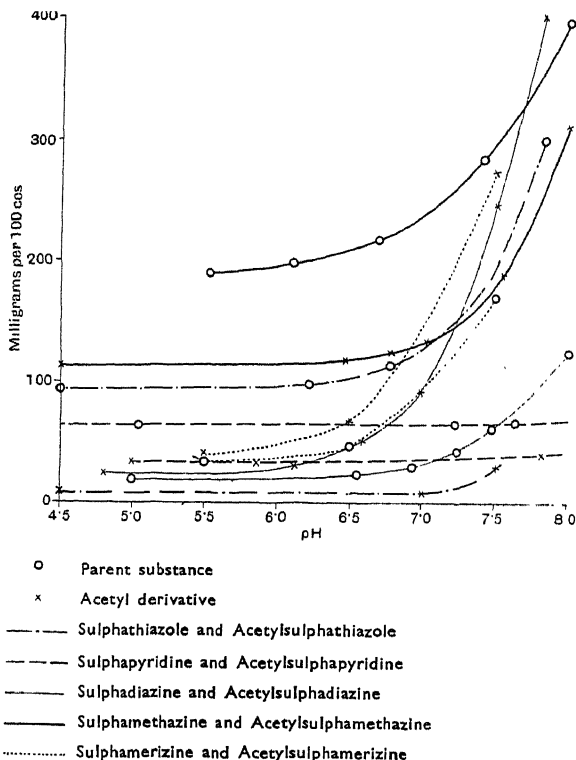


Fig. 14.—Solubility of sulphonamides and their acetyl derivatives at different pH values.

filtrate in the tubules; and the solubility of the free and/or acetylated sulphonamide at the final pH of the urine. The accompanying graph (Fig. 14) shows the solubilities of the free and of the acetylated forms of five members of the group at different pH values. So far as the present writer is aware, no case of urolithiasis has been reported in connection with sulphanilamide, of which the acetyl derivative has a solubility, at 37° C. and at pH 6.5, of 250 mg. per 100 c.c. At the same temperature and pH acetylsulphathiazole has a solubility of only about 10 mg./100 c.c. It is evident, then, that deposition of crystals of the latter body is much more likely to occur. From the graph it will be seen that, with the important exception of sulphapyridine, the solubility of all these compounds rises, sometimes very sharply, with increasing pH. It is evident then that the

risk of urolithiasis occurring is reduced, often very considerably, by bringing the urinary pH at least to a neutral point. If we assume, admittedly empirically, that the danger ceases when the solubility rises above 100 mg./100 c.c., only 4 of the 10 compounds will be free from risk at pH 7.0, the neutral point, namely, sulphathiazole, acetylsulphamerizine, sulphamethazine, and its acetyl derivative. By pushing the administration of alkalis, it may be possible to reach a pH of 8.5 in the urine, and at this point all, except probably sulphapyridine and its acetyl derivative would have solubilities above the danger line. With sulphapyridine, however, it seems that the risk can only be excluded by maintaining a high urinary output and so diluting the concentration of the drug in the urine. In general, when using sulphonamides except sulphapyridine and probably sulphathiazole, there will be little need to raise the urinary pH above 7.5, a value which can readily be attained with ordinary doses of the alkalis. (See also ANURIA, SULPHONAMIDE.)

Recently there have appeared reports of fatal damage to internal organs, kidney, liver, etc., caused by sulphathiazole.¹⁴⁻¹⁸ A similar condition has been produced with sulphapyridine in animals.³ It would seem that these must be caused by direct action of the drug on the organs concerned, and it is unlikely therefore that administration of alkalis would have any preventive action.

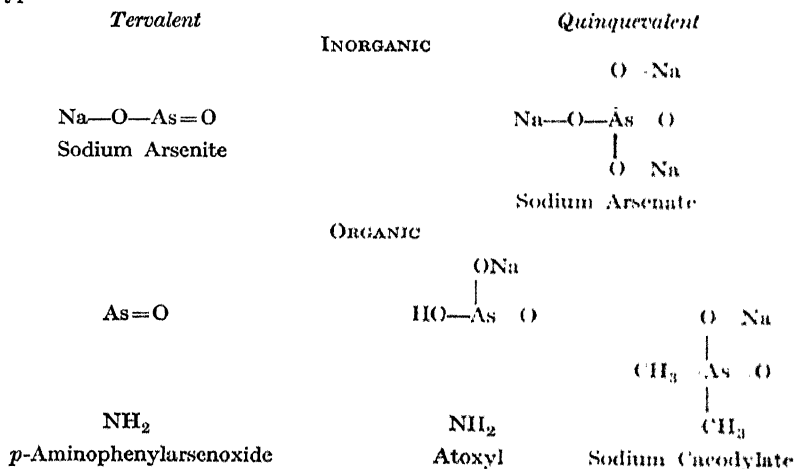
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CHEMOTHERAPY OF SYPHILIS: MAPHARSIDE (Mapharsen in U.S.A.).

(See also SYPHILIS.)

R. St. A. Heathcote, D.M., F.R.C.P.

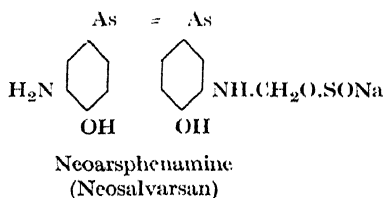
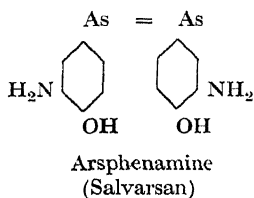
The empirical use as 'alteratives' of the inorganic forms of arsenic in the treatment of syphilis dates back some 300 years, to the time of Fallopius. The first organic arsenical to be employed appears to have been sodium cacodylate, which gradually becomes changed in the body to the inorganic arsenite. It has been shown that the cacodylates are completely ineffective in the treatment of syphilis.¹



Until the causative organism, *Treponema pallidum*, was discovered by Schaudinn in 1905, little advance on the time-honoured and empirical (but effective) use of mercury was possible. At this time, however, trypanosomes were well recognized as being the causative organisms of several diseases in animals, e.g., surra, nagana; and Bruce and Nabarro had just identified (1903) one of them, *T. gambiense*, as giving rise to sleeping sickness in man.

Thomas of Liverpool² in 1905 made the first observation in chemotherapy with arsenic. He found that the quinquevalent organic arsenical, atoxyl, could cure laboratory animals infected with trypanosomes. His publication attracted the attention of Ehrlich, who then started upon the classical series of researches in chemotherapy which resulted in the introduction of the antisyphilitic drugs 'Salvarsan' (arsphenamine) in 1909 and 'Neosalvarsan' (nearsphenamine) in 1912.

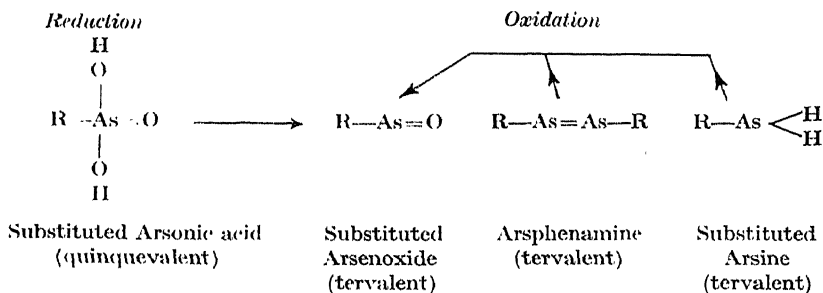
Ehrlich confirmed the observations of Thomas in experiments *in vivo*, but found that *in vitro* atoxyl is devoid of action on trypanosomes. On reduction of the quinquevalent compound to the corresponding tervalent substance, *p*-aminophenyl-arsenoxide, a drug very actively trypanocidal both *in vitro* and *in vivo* was obtained, which however was found to be excessively toxic to animals. Having thus established the fact that tervalent arsenicals are more active than quinquevalent, he continued the process of reduction to the next stage, in which two substituted benzene rings are joined by two atoms of arsenic, themselves united by a double bond, the group of the arsphenamines. He found further that changes in position and in nature of the groups substituted in the benzene rings gave compounds of different degrees of efficacy and of toxicity and that of these various compounds the best was the original 'salvarsan' with an amino group in the meta- and a hydroxyl in the para- position, relative to the atom of arsenic, in each of the two rings. 'Neosalvarsan' is derived from this by a further change in one of the two amino groups.



Ehrlich had in mind the production of a drug which, in a single dose, or at most in a few, would destroy the whole host of invading organisms, a "therapia magna sterilisans". Even had his researches proved unfruitful, his name would still go down as that of the Father of Chemotherapy, because of his insight into the theoretical aspects of the subject. He postulated that a drug to be efficient must be maximally "parasitotropic", i.e., have a vigorous direct action on the parasite, and minimally "organotropic", i.e., have little or no ill effect on the host. This is measured to-day by the estimation of the Therapeutic Index, the ratio between the maximum tolerated dose (in animals that amount per kilo which will not kill more than 10 per cent) and the minimal curative dose (that amount per kilo which will save the lives of not less than 90 per cent of infected animals). While the "therapia magna sterilisans" resulting from the administration of a single dose is still the desideratum, this could be attained in one of two ways at least. The drug when given in a dose tolerated by the host might immediately kill all the parasites by a direct action, or it might be stored temporarily in the body and be gradually released to the blood in an

active form in such a concentration as to be lethal to the parasites over a period of hours. If however the maximum tolerated dose of the drug is not sufficient to kill all the parasites either at once or over a period of time, the "Blitzkrieg" attack of the "therapia magna" must be abandoned for a "war of attrition". Now a time factor comes into play, for while a large proportion of the parasites may be killed by a single tolerated dose of the drug, the survivors will be able to multiply in the host over a period of time which elapses between the separate administrations. The shorter these periods are, the less will be the degree of multiplication and presumably progressively fewer will be the survivors after each administration. Here the question of excretion of the drug becomes of paramount importance in defining the interval of time between doses. If the drug is rapidly excreted, the intervals can be short without risk of accumulation and so of chronic toxic effects. If the drug, on the other hand, is merely altered to a less acutely toxic form and then stored in the body, the intervals must be longer to avoid these risks and there will be more time for reproduction of the parasites to occur.

Ehrlich found that trypanosomes, after exposure to the action of a neutral solution of neoarsphenamine of strengths such as might occur in treatment of man, were unable to cause disease in animals. He thought therefore that it and arsphenamine possess a direct action on the parasites. Doubt was soon cast on this view, however, as it was found that even in much stronger solutions the parasites were not actually killed. It was deduced therefore that the host in some manner or other so affected the drug, the parasite, or both together, that a lethal action was obtained.



The nature of this change has been very carefully examined^{3, 4, 5}, and it is now generally agreed that the arsphenamines must undergo partial oxidation to the arsenoxide form before becoming actively parasiticidal. This deduction is based largely on the relations between the time of administration of the drug and the clearing of the animal's blood of parasites (trypanosomes). With the quinquevalent compounds such as atoxyl, there is a long latent period, 12 hours or more, before the action is manifest. With the arsphenamines the period is less, 3 to 6 hours. With the still further reduced compound, *m*-amino-*p*-hydroxyphenyl arsine, the latent period again increases. With the corresponding arsenoxide, however, and with a solution of an arsphenamine which has undergone partial oxidation, there is no latent period, the drug commencing to act immediately after administration. Now, on chemical grounds it is argued that the reduction of the quinquevalent arsonic acid to the tervalent arsenoxide and the oxidation of the arsine to the arsenoxide should require a longer time than would the oxidation of the arsphenamine to the same form. If then the arsenoxide is the active substance, all these observations fall into line. Eagle^{5, 6} has shown that *in vitro*

the arsenoxide is effectively treponemicidal in high dilution whether the experiments are carried out in air or in an atmosphere of nitrogen. On the other hand, in an atmosphere of nitrogen neoarsphenamine is almost entirely inactive even in much higher concentrations. If, however, the solution of neoarsphenamine is exposed to the air even for a few minutes only, it becomes equally as active as that of the arsenoxide. This again supports the results obtained with trypanosomes *in vivo*. Finally the arsenoxide corresponding to arsphenamine has been detected in the blood after administration of the latter drug.⁷

The arsenoxide corresponding to arsphenamine has been prepared, and the hydrochloride, in the form of its hemi-alcoholate, has been put on the market under the name "mapharside" (or "mapharsen" in the U.S.A.). Curiously enough, it was one of the many arsenicals examined and rejected by Ehrlich and Hata. They found it to be, as in fact is the case, very poisonous to animals. This in itself would not be sufficient to justify its rejection, but it was regarded by them as having a Therapeutic Index lower than that of arsphenamine and neoarsphenamine. This, if substantiated, would at any rate go far to justify its rejection. The Therapeutic Index has been re-investigated by several workers⁸⁻¹¹ and complete agreement has not been reached on the point. On the whole, however, the balance of evidence would seem to suggest that there is little difference in this respect between the various compounds.

This being so, certain secondary characteristics of both mapharside and the arsphenamines should be brought into consideration to enable a choice to be made between them. The earlier experimental work was performed chiefly on trypanosomes, both *in vitro* and *in vivo*, but more recently *Treponema pallidum* has been used. How distantly or how closely related these two genera of organisms are, is still a matter of dispute, and consequently it is not possible to say whether results obtained with trypanosomes can be directly applied to infections with *Treponema*. Again, although various species of the latter have been grown artificially, it is doubtful whether the human species, *Treponema pallidum*, can multiply outside the body. Further, syphilis in the rabbit, while similar to, is not identical with syphilis in man. It seems probable, therefore, that the only really reliable test of an antisyphilitic drug is its use on a large scale in man. With this qualification, however, mapharside has proved at least equally as good as, if not better than, neoarsphenamine in the experimental laboratory.

Ehrlich thought that with arsphenamine and neoarsphenamine the "Blitzkrieg" type of medication would be attained, but it was soon found that repeated administration is necessary for cure, supported by the use of mercury, or more recently of bismuth, the "war of attrition". Now comes into play the question of excretion and accumulation in the body.

Neoarsphenamine is given in large doses, of which a part only, of the order probably of 10 per cent, becomes activated to arsenoxide, and the remainder, about 90 per cent, is stored for a long time in a non-treponemicidal form in the body. This fraction is however, potentially at least, toxic and is capable of causing chronic forms of poisoning. Mapharside, on the other hand, is given in amounts only one-tenth as large as is neoarsphenamine, and, supposing the number of injections required to be the same with both drugs, the total amount of arsenic used as mapharside would be about one-seventh of that used as neoarsphenamine. Chronic poisoning should therefore be far less likely to occur with the former, even if the rate of excretion were the same with both. There is evidence, however, that excretion is considerably greater with mapharside. It has, in fact, proved possible to administer a course of 1.2 g. or even more in five days, either by slow drip methods or by repeated small injections.^{12, 13} The results of such courses have, so far, proved excellent, some 90 per cent of

early cases of syphilis being rendered serologically negative for periods up to at least 6 to 12 months. These cases, moreover, do not seem to have been given bismuth, and it is possible that even better results might be obtained with the combined treatment. It has now been used in America for some 8 years,¹⁴ and the results have been so satisfactory that both in the U.S. and the Canadian Armies it is the only arsenical used in early cases. The present writer has seen no accounts of its use in neurosyphilis and can express therefore no opinion as to whether it is likely to supersede tryparsamide in such cases.

On the whole, toxic effects following the use of mapharside seem to be considerably fewer and less severe than those after neoarsphenamine. According to Parsons,¹⁵ non-fatal accidents with the former have only about one-fifth the frequency of those with the latter. A few fatalities have been reported,¹⁶ but 3,000,000 injections of mapharside were given before the first death occurred. There is some evidence that it can be used with relative safety in cases which have become sensitive (milder degrees of dermatitis only) to neoarsphenamine.¹⁷ One of the common causes of toxic effects with the arsphenamines is the colloidal nature of the drugs, which may bring about changes in the state of aggregation of the blood proteins. Mapharside, being a crystalloid, is free from this disadvantage.

Different specimens of the arsphenamines, particularly neoarsphenamine, vary in the degree both of their toxicity and of their efficacy. Each batch, as prepared by the manufacturers, has therefore to be subjected to biological tests for both these properties before being issued for use. Mapharside is, however, a pure chemical entity, and chemical assay alone *should* be sufficient to determine whether any given specimen is fit for use.⁸ The present writer believes, however, that tests for toxicity are performed on each batch, perhaps *ex abundantia cautelae*. It would be a great advantage if complete reliance could be placed on the results of chemical assay alone.

Ease of preparation should be only a minor consideration in deciding on the choice of a drug. None the less, there are considerable advantages in this direction in the use of mapharside as compared with the arsphenamines. Arsphenamine as marketed is a strongly acid substance, and its solution *must* be neutralized before being given. Solutions of neoarsphenamine are neutral but must be used immediately after being made, as oxidation, with greatly increased toxicity, occurs on only a few minutes' exposure to the air. Mapharside is put up as the hydrochloride with a sufficiency of dry sodium carbonate in the ampoule to give a neutral solution. Exposure to the air does not increase, but rather slightly reduces, the toxicity.

Attempts have been made to improve on mapharside by varying the nature and position of the substituent groups on the benzene ring. Eagle and his colleagues^{18, 19} examined some forty of these and found none to be of any greater promise, though they do not exclude the possibility of finding a better compound.

The present writer has been informed that, so far at least, mapharside has not met with great approval in this country and that neoarsphenamine is still preferred. It is of course true that a period of 6 or 12 months is not long enough to judge of the permanence of the serological changes observed. On the other hand, if sufficient beds were available in hospitals, the intensive treatment with mapharside would have great advantages in rendering patients rapidly non-infective. It seems probable that permanence of the cure would be rendered more likely to occur if a course of injections of bismuth were given in addition to the mapharside. A summary of recent work on the whole subject has been published by Eagle and Hogan.²⁰

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⁵Eagle, *J. Pharmacol.* 1938, **64**, 164; ⁶Eagle, *Ibid.* 1939, **66**, 10; ⁷Rosenthal, *U.S. publ. Hlth. Rep.* 1933, **48**, 969; ⁸Tatum and Cooper, *J. Pharmacol.* 1934, **50**, 198; ⁹Gruhzit, *Arch. Path.* 1934, **18**, 582; ¹⁰Gruhzit, *Arch. Derm. Syph.* 1935, **32**, 848; ¹¹Raiziss and Saverac, *Amer. J. Syph.* 1935, **19**, 473; ¹²Leifer et al. *J. Amer. med. Ass.* 1941, **117**, 1154; ¹³Elliot et al., *Ibid.* 1160; ¹⁴Foerster et al., *Arch. Derm. Syph.* 1935, **32**, 859; ¹⁵Parsons, *U.S. Nav. med. Bull.* 1940, **38**, 168; ¹⁶Lewin and Keddie, *J. Amer. med. Ass.* 1942, **118**, 368; ¹⁷Schoch et al., *Arch. Derm. Syph.* 1940, **42**, 919; ¹⁸Eagle et al., *J. Pharmacol.* 1940, **70**, 211, 221; ¹⁹Eagle et al., *Ibid.* 1942, **74**, 210; ²⁰Eagle and Hogan, *Can. Dis. Inf.* 1943, **24**, 33, 69, 155.

CLEFT PALATE.

Sir John Fraser, M.Ch., F.R.C.S.Ed.

In 1925 C. M. Dorrance described a new operation for the closure of cleft palate; he called it the "push-back" operation, an appropriate title, because it expressed with commendable accuracy the principles underlying the method. The operation has met with a considerable measure of approval; it is recognized that it has one particular advantage—a greater degree of mobility of the soft palate than is provided in most types of palato-plasty, and there is no doubt that this mobility permits the acquisition of one of the basic necessities of speech is to be satisfactory, complete velopharyngeal closure.

There have been criticisms, however; on two grounds in particular—the liability of the mobilized segment to undergo fibrosis, and the exposure of the bone defect when the cleft involves the anterior portion of the hard palate. Dorrance¹ recognizes the pertinence of these objections, and to meet the criticisms he has added two points of detail which in his opinion have improved results in a material degree. They are: (1) lining the nasal surface of the push-back segment with a split skin graft, and (2) the use of the mucoperiosteum covering the vomer to repair the defect in the anterior portion of the hard palate. The technique of the skin-graft application is shown in *Plate VIII, Fig. A*. The graft is applied either at the time of the separation of the velopalatine segment, or, if the blood-supply of the latter should be insufficient to justify immediate displacement, some weeks later when the secondary vascular flow has become assured. The graft is sutured to the nasal surface of the push-back segment, and pressure on the graft surface is maintained by a pack of iodoform gauze held in position by silver wire twisted around the teeth (*Plate VIII, Fig. B*).

That the mucoperiosteum of the vomer might be used to close the hard palate gap was first suggested by Lannelongue in 1872; in later years Veau made extensive use of the same procedure, and at the present time this valuable point of technique is frequently incorporated in standard operations. The usual procedure is to suture the vomerine flap to the edge of the mucous membrane on the nasal surface of the palate. Dorrance recommends a modification, in which the flap edge is passed underneath the mucoperiosteum on the oral surface and sutured in this position (*Plate IX, Figs. C, D*).

There is a conflict of opinion about the value of the push-back operation. In theory it appears to have the particular advantage of creating an increase in the extent of the velum and associated structures, the effect of which should be to ensure closure of the velopharyngeal sphincter during swallowing and speech. If such could be guaranteed, the sufficiency of the procedure would be beyond question. As already indicated, criticism has been expressed on two points. The modifications described are designed to meet them, and, if they do so adequately, the operation may prove to be of outstanding value in correcting palatal defects and in reconstituting a disordered palato-pharyngeal physiology.

REFERENCE.—¹*Ann. Surg.* 1943, **117**, 1.

COLD: THE EFFECTS OF.

Macdonald Critchley, M.D., F.R.C.P.

The MEDICAL ANNUAL for 1943, p. 175, gave an account of the peripheral effects of extreme cold. Attention was particularly devoted to that important

PLATE VIII

CLEFT PALATE REPAIR

(C. M. DORRANCE)

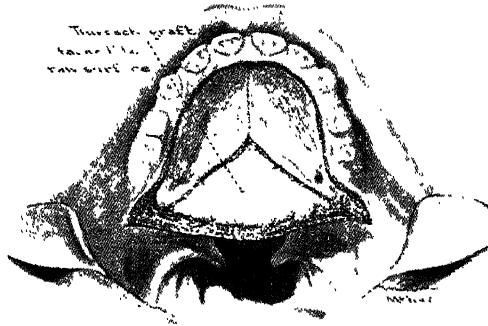


Fig. A.—The mucoperiosteum of the hard palate has been separated and a split skin graft has been applied and sutured on the raw surface of the flap.

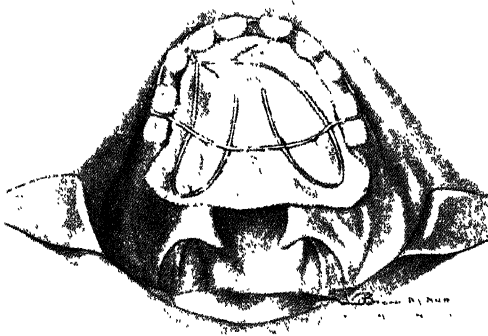


Fig. B.—Method of placing silver wire to hold iodoform gauze in place after application of the split skin graft.

Plates VIII, IX reproduced from the 'Annals of Surgery'

PLATE IX

CLEFT PALATE REPAIR—*continued*

(C. M. DORRANCE)

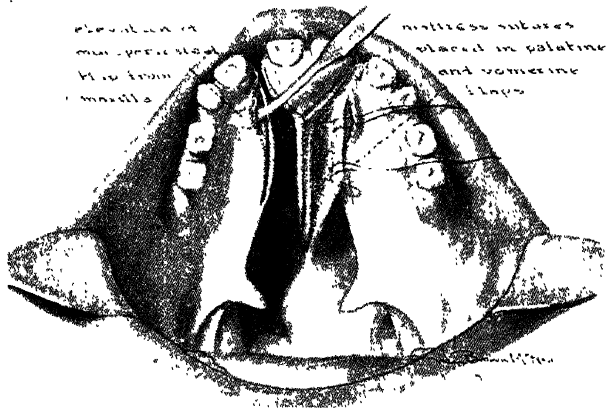


Fig. C.—Method of elevating and suturing the vomer flap in double lip jaw palate cleft.

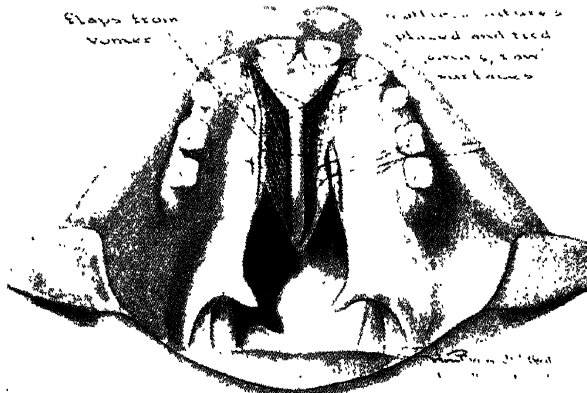


Fig. D.—Completed double vomer flap in double lip jaw palate cleft.

wartime affection—'immersion foot'—a term which we owe to Surgeon Captain D'Arcy, R.N.

The *general* effects of cold are far less familiar. Until recent years it was not possible to study in the physiological laboratory the phenomena which accompany exposure to extremely low temperatures. Animal work, of very limited utility, was of course possible, but human studies were more or less out of the question. Such human data as there were, dealt mainly with the 'tonic' effects of milder degrees of lowered temperature. Within the past few years, however, some new clinical data have become available, from two main sources: (1) The experiences from refrigeration therapy; and (2) The depositions of shipwrecked personnel.

1. Refrigeration Therapy.—T. Fay and L. Smith¹ described the effects upon cancerous growths of a lowering of the body temperature by 10° F. ("hibernation" treatment). Similar studies were carried out in New York,² where the term "crymotherapy" was coined. J. H. Talbot³ introduced the expression "hypothermia" for this form of treatment. From all these reports it is now known that the internal temperature of man can be reduced to as low as 75° F. or even 70° F. The technique recommended by Talbot consists in laying the naked patient (who has 20 minutes earlier been given an intramuscular injection of 3 gr. of nembutal, followed just before the exposure by an intravenous dose of 0.5 to 0.7 g. of evipan) in an atmosphere of 32° F. An intra-rectal thermocouple records the internal temperature, which is maintained between 80° and 90° F. for the first 24 hours. This period serves as a trial. Thereafter one or more periods of 2 to 4 days each may be given at 2- or 3-weekly intervals.

Restoration of temperature is effected slowly, being not without risk. A rise of not more than 2° F. per hour is allowed. The authors do not mention serious after-effects, other than pneumonia in the case of patients with pulmonary carcinoma.

During the hypothermic stage, the blood-pressure and the pulse-rate at first rise and then gradually fall. Veins empty and large arteries contract (but so far thromboses have not been recorded). Circulation time is retarded; pupillary reflexes are abolished; sinus arrhythmia and auricular fibrillation often occur. A hæmoconcentration takes place with a 25 per cent increase in the red-cell count. White cells increase considerably, with a relative polymorph leucocytosis.

T. Fay and G. W. Smith⁴ have made neurological examinations of 42 patients, observed during 83 periods of refrigeration, each period lasting from 24 hours to 5 days. When the body temperature has dropped to between 97° F. and 85° F., the deep reflexes increase. This period corresponds with the stage of shivering. As the body temperature approaches 78° F. the deep tendon and the gag reflexes become abolished, as well as the abdominal responses. Reflex pupillary contraction to light becomes more and more sluggish as the temperature falls, and is abolished at 78° F. Dysarthria begins at 93° F., while articulation is well-nigh impossible below 80° F. Cerebration is gradually retarded as the body cools, though mental faculties are preserved until the 93° F. mark is reached. For all periods maintained below that level a retrograde amnesia develops. Pain and temperature sensibility remain intact, but spontaneous pains were relieved in all but two instances (4.7 per cent). No permanent neurological alterations resulted from the hypothermia.

Whether this remarkable form of treatment has come to stay is dubious. Further reports are awaited, and if it should transpire that the measure proves disappointing in its results or dangerous in its application, it is sincerely to be hoped that the original authors will come forward and say so.

2. Depositions of Shipwrecked Personnel.—Experiences of exposure to cold have been narrated by M. Critchley⁵ in a study of shipwrecked sailors adrift in small craft at the mercy of the North Atlantic or Arctic weather. The sequence of events seems to be: shivering, headache, increasing reluctance to move, an attitude of generalized flexion, drowsiness, torpor, and death. This can be a matter of hours, or less. It is now believed that the duration of life when immersed in sea-water at about freezing-point rarely exceeds 30 minutes. Individuals vary as to their resistance to extremes of cold, and *ceteris paribus*, corpulent, powerfully built, athletic European males of young adult age withstand the rigours best. Although children and women tolerate milder degrees of cold well, they succumb quickly to extremely low temperatures. Some measure of habituation and acclimatization is possible. The wounded put up a poor resistance to cold, for, as A. Blalock⁶ showed, cold increases the effect of surgical shock.

The psychological effects of dangerous degrees of cold are mainly conjectural, and further study is desirable, albeit difficult. As far as we can say, there occurs a difficulty in sustaining attention, a feature which is common to other painful experiences. Upon this disorder of exterojection—which may interfere gravely with the efficiency of those on watch—there develops an increasing drowsiness. Some measure of depression is to be anticipated, though probably less than might be expected—as indeed seems to be the rule with other types of physical pain or discomfort. A certain callousness, or indifference to the sufferings of others, may be noted, as mentioned by Moricheau-Beaupré,⁷ who was present at Napoleon's retreat from Moscow. He wrote of a loss of morale leading to general discomfort, souring of the minds, and hardening of the hearts. "We become insensible, selfish, and avaricious." There is also some evidence to suggest that the later stages of impending death from cold are painless . . . perhaps even euphoric.

The last-named author has also left us a vivid account of the terminal events during exposure to cold: "Shiverings, puckerings, paleness, and coldness of the skin, livid spots, muscular flutterings and symptoms of the shock given to the vital forces; the person feels syncope approaching, his stiff muscles contract irregularly; his body bends and shrinks; his limbs are half-bent; sometimes lassitude and languor invite him to stop to repose; sometimes a feeling of weight and general numbness retard his steps; his knees bend, he squats down and falls; he then feels an invincible propensity to sleep; everything grows strange to him; his senses are confused; a thick veil darkens his view; his mind grows dull, his ideas incoherent; he stammers and raves; if he be free from suffering, he is not often so from agitation. Should you try to prevent him from stopping and sleeping, should you strongly represent to him the danger to which he exposes himself, he looks at you coldly and stupidly; if he has not lost all consciousness, he pronounces with difficulty a few words, entreating to be allowed to go to sleep; his relations with all surrounding objects quickly cease; he slumbers; the parts farthest from the centre of the circulation become cool; respiration, at first interrupted, becomes slow; the contractions of the heart become feeble, quick, hard, irregular, and sometimes painful; the pulse becomes smaller progressively; the central beat is extinguished; the brain is stupified; the pupil dilated; finally, a deep and mortal coma may be regarded as a certain sign of approaching inevitable death, unless the asphyxiated receive timely assistance."

Despite our wartime experiences of perilous degrees of exposure, we are not a great deal wiser than they were in 1812 as to the physiological effects of cold. The *modus moriendi* is not altogether understood. Relationship with the mammalian function of hibernation is suggestive but cannot be assumed. The nature of somnolency is obscure—whether indeed it is a morbid manifestation

which should be resisted (by pharmacological as well as mechanical means); or whether it is a protective measure which should be encouraged.

Two recent contributions to the physiology of cold deserve a special note.

G. M. Roth and M. A. Gabrielson⁸ have reported that after prolonged immersion in cold water gastric acidity arises. This observation, which requires to be confirmed, may have clinical bearings, especially if dyspepsias or symptoms of peptic ulcer are found to develop in sailors after torpedoing. Questions of attributability will arise in such cases, and will have to be answered.

B. T. Horton and G. M. Roth⁹ have drawn attention to the possibility of a hypersensitivity to cold leading to collapse while swimming. Their interest was aroused by an experiment wherein a man of 22 was required to sit for 4 minutes with his hands, legs, and thighs immersed in water at 11° C. (51·8° F.). Shortly afterwards he collapsed and on recovery gave a story of having once passed out in similar fashion while swimming. A series of 22 subjects were therefore studied from the aspect of local and general effects of cold. Fourteen of them showed systemic effects; eleven had attacks of syncope (four had to be rescued from the water). Similar cases were traced in the literature. The authors devised a clinical list for cold hypersensitivity, as betrayed by a fall in blood-pressure, tachycardia, and flushing of the face after five minutes' immersion of the hands in water at 8°–10° C. Such persons can be de-sensitized to cold in either of two ways: (1) by periodic soaking of the hands in water at 10° C. for 1–2 minutes twice a day for 3–4 weeks; and (2) by the subcutaneous injection of 0·1 mg. (or less) of histamine twice a day for 2–3 weeks.

REFERENCES.—¹*Brit. med. J.* 1940, **1**, 979; ²*Ibid.* **2**, 528; ³*New Engl. J. Med.* 1941, **224**, 281; ⁴*Arch. Neurol. Psychiat.* 1941, **45**, 215; ⁵*Shipwreck-survivors; a Medical Study*, 1943, London, Churchill; ⁶*Arch. Surg.* 1934, **29**, 1055; ⁷*A Treatise on the Effects and Properties of Cold*, trans. by J. Glendinning, 1826, Edinburgh; ⁸*Amer. J. Physiol.* 1940, **131**, 195; ⁹*Proc. Mayo Clin.* 1937, **12**, 7.

COLITIS, ULCERATIVE: TREATMENT WITH SULPHONAMIDES.

Sir Henry Tidy, M.D., F.R.C.P.

M. A. Mills and T. T. Mackie¹ (New York) report on the use of various *sulphonamide* preparations in the treatment of 109 unselected cases of acute and fulminating to chronic ulcerative colitis from the Colitis Clinic of the Roosevelt Hospital. Sulphathiazole was used alone in 59 and proved the most efficient in acute cases. Of these 23 were definitely improved and 8 were not improved, and 5 were sensitive to the drug. The doses employed were usually 6 g. daily for several days with a total dosage of 40 g. per patient. Sulphadiazine and sulphaguanidine were almost equally effective. The present status of the 109 patients is as follows: 15 have been in remission for 6 months to 2 years; in 35 the disease is quiescent but needs continued treatment; 55 are still improving under active therapy; and 17 are unimproved.

C. C. Crohn² (New York) reports on the use of succinylsulphathiazole in the treatment of 28 patients with non-specific ulcerative colitis. The dose used was 0·25 g. per kilo of body-weight for 10 days; after a lapse of 5 days a second series was given. With severe diarrhoea some form of opium was administered concurrently to slow down the intestinal discharge and to permit a natural concentration of the drug. In 5 an apparent and quick symptomatic cure was obtained and 11 more cases showed definite improvement. The best results are seen in acute colitis, and intensive treatment with the drug in early stages may prevent the development of the chronic form. Toxic effects were few, loss of appetite was frequent, but nausea or vomiting was rare.

[These communications are representative of a small number recording favourable results with sulphonamide in the treatment of acute and chronic non-specific ulcerative colitis. Nevertheless the opinion is widespread among those with

experience that the results with sulphonamide are no better than with other forms of treatment, and contrast with the undoubted specificity in certain types of bacillary dysentery.—H. L. T.]

REFERENCES.—¹*Amer. J. digest. Dis.* 1943, 10, 55; ²*Gastro-enterology*, 1943, 1, 140.

COLON, SURGICAL DISEASES OF. (See also DIVERTICULITIS OF THE COLON.)

A. Rendle Short, M.D., F.R.C.S.

Ulcerative Colitis.—A report is furnished by Barger and co-workers¹ of 185 cases of this disease treated at the Mayo Clinic by ileostomy, spread over the years 1913 to 1939. Of these, 85 lived less than a fortnight, but 130 survived for six months or more. Of these, 79 were definitely improved, though only half of them were symptom-free; 25 were no better, and 26 got worse and died. The best results were obtained in young patients with a relatively brief history, when the operation was for chronic intractable symptoms rather than for an acute exacerbation.

Sir Hugh Devine² relates how he dealt successfully with one very severe case in a woman of forty, who was originally operated on for supposed acute appendicitis. The bleeding was so severe that she was only kept alive by blood transfusions. He operated in stages: At the first, an ileostomy was performed, the distal cut end was brought out through a stab wound in the left iliac fossa, the terminal loop of the proximal ileum was sewn side-to-side to the lower sigmoid, and the sigmoid cut across, and both ends brought out through the wound. Thus the colon was completely excluded from the food-way, except for a short segment of lower sigmoid. At the second stage, the ileo-recto-sigmoid septum was crushed with a spur-crusher, thus allowing ileal contents to pass by the rectum, which was not badly diseased. At the third stage, the patient being now greatly improved in health, the distal end of the ileum and the end of the proximal loop of sigmoid were both closed. This, however, led to much pain, and, at a fourth stage, colectomy was performed.

(See also COLITIS, ULCERATIVE, TREATMENT WITH SULPHONAMIDES.)

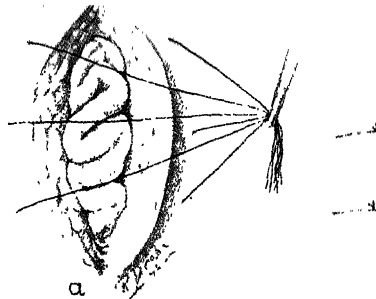
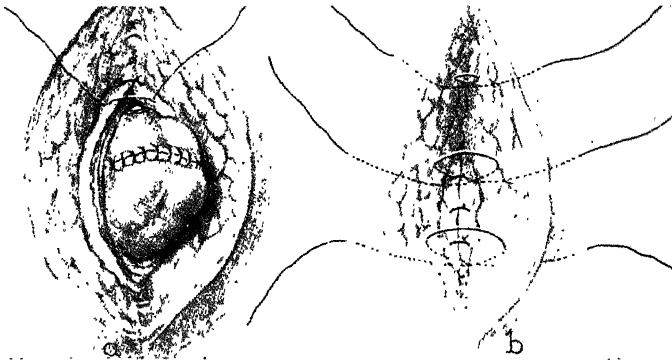
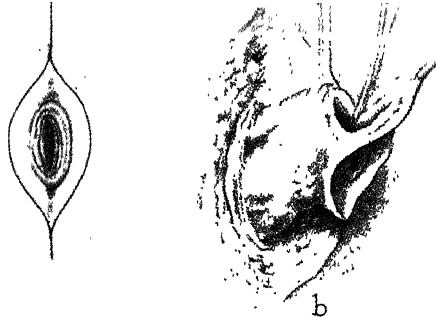
Benign Tumours of the Colon.—According to Elson B. Helwig,³ the commonest benign tumour of the colon is adenoma of the sigmoid; next comes lipoma, usually in the cæcum or ascending colon; leiomyoma and carcinoid are rare.

Carcinoma of the Colon.—F. H. Lahey and Eric Sanderson,⁴ of Boston, have been impressed by the frequent association of grave anæmia with carcinoma of the ascending colon, though no adequate explanation is forthcoming. It is unfortunate that the symptoms are often so quiet that diagnosis is made very late. They prefer the Mikulicz method of operative removal. The ureter must be freed from the peritoneum to allow of adequate hemi-colectomy. Half the transverse colon should be removed, and the proximal end of the ileum attached side by side to the remains of the transverse colon and brought out through the abdominal wall. A quite long loop of ileum should be utilized for this purpose. A tube is inserted in the ileum to allow faeces and flatus to escape from the first. The spur is clamped on the seventh day, and re-applied deeper a few days later. T. E. Jones and colleagues,⁵ of Cleveland, Ohio, report 77 operations by the Mikulicz technique, as modified by Rankin, for carcinoma of the transverse or left colon, with a mortality of 6.5 per cent. H. B. Stone and S. McLanahan,⁶ of Baltimore, put in a plea, in carefully selected non-obstructed cases, for immediate resection and end-to-end suture by some aseptic technique. They report 104 cases with a death-rate of only 10.6 per cent. The advantage, of course, is that it saves the necessity for multiple operations. The Miller-Abbott tube, and the administration of succinyl sulphathiazole before operation, appear to help reduce the mortality.

PLATE X

CLOSURE OF COLOSTOMY

(J. DE J. PEMBERTON AND B. M. BLACK)



Reproduced from 'Surgery, Gynecology and Obstetrics'

Prolapsed Bowel after Colostomy—Prolapse of the proximal or afferent loop is of course a well-recognized complication of a colostomy, but J. L. Keeley,⁷ of Chicago, relates 5 cases of prolapse of the distal or efferent loop. It appears to be due to a too large defect in the abdominal wall, together with redundancy of the bowel distal to the colostomy, and increased intra-abdominal pressure. A support may be sufficient to prevent return of the prolapse after reduction, or the condition may call for operation to reduce the size of the gap, and remove the prolapsing mucosa.

Closure of Colostomy—John de J. Pemberton and B. Marden Black,⁸ of Rochester, Minnesota, maintain that closure is much more likely to be successful, and to heal cleanly, if after reducing the spur, closing the hole in the bowel wall, excising the edges of the wound in the abdominal wall, and approximating the muscles and fascia with catgut sutures, the skin and subcutaneous fat are left open with an iodoform gauze pack. Silkworm-gut sutures are inserted into the skin and fat at the time of the operation, but only pulled tight and tied forty-eight hours later, when the pack is removed. (*Plate X.*)

Diverticulitis.—J. W. Baker and T. Carlile,⁹ of Seattle, describe 2 cases of *diverticulitis of the cæcum*. Widespread peritonitis was present in the one, and a localized abscess in the other. The pre-operative diagnosis in both was appendicitis. The diverticula were removed, and the patients recovered.

REFERENCES.—¹*Ann. intern. Med.* 1943, **18**, 43; ²*Surg. Gynec. Obstet.* 1943, **76**, 136; ³*Ibid.* 419; ⁴*J. Amer. med. Ass.* 1942, **120**, 1356; ⁵*Surg. Gynec. Obstet.* 1943, **76**, 236; ⁶*J. Amer. med. Ass.* 1943, **120**, 1362; ⁷*Surg. Gynec. Obstet.* 1942, **75**, 605; ⁸*Ibid.* 1943, **76**, 385; ⁹*J. Amer. med. Ass.* 1943, **122**, 354.

CONGENITAL ATRESIA OF BILE-DUCTS. (*See BILE-DUCTS, CONGENITAL ATRESIA OF.*)

CONGENITAL ATRESIA OF THE ŒSOPHAGUS. (*See ŒSOPHAGUS, CONGENITAL ATRESIA OF.*)

CONGENITAL HÆMANGIOMATA OF THE SKIN. (*See SKIN, CONGENITAL HÆMANGIOMATA OF.*)

CONGENITAL INTESTINAL OBSTRUCTION. (*See INTESTINAL OBSTRUCTION IN THE NEWBORN.*)

CORNEA: INTERSTITIAL KERATITIS.

Sir Stewart Duke-Elder, M.D., F.R.C.S.

Interstitial keratitis—a common late complication of congenital syphilis—has always been a therapeutic problem, since antisymphilitic treatment does not have the same dramatic effect upon the disease as upon most other syphilitic lesions. The value of fever therapy has lately been stressed (*MEDICAL ANNUAL*, 1942, p. 77); recently favourable results, which, however, have not been generally confirmed, have been reported with riboflavin (H. D. Krause, V. P. Sydenstricker, W. H. Sebrell, and H. M. Cleckley¹; V. P. Sydenstricker, A. R. Kelly, and J. W. Weaver²), and still more recently S. Stone³ has written of the results obtained with vitamin E. He was attracted by the beneficial effect observed by the administration of this substance on the rate of absorption of tissue-exudates in cases of arthritis deformans and pseudo-hypertrophic muscular dystrophy, and has claimed improvement in the treatment of 10 patients with interstitial keratitis, all of whom had received ample antisymphilitic treatment and yet had actively diseased eyes.

According to the author vitamin E was mainly effective in hastening absorption of superficial and deep corneal exudates; it helped to relieve the associated

photophobia and reduce excessive corneal vascularization and circumcorneal congestion. In cases of long-standing involvement with extensive opacities and corneal scarring, its administration for a period of months produced a gradual and continuous clearing of the cornea with a return of normal vision. In one case complete clearing of the cornea occurred after eighteen months of vitamin therapy, although only perception of light was present in one eye and perception of fingers in the other when therapy was begun. Absorption of corneal exudates and return of normal vision took place in another case after four weeks of vitamin therapy alone.

Riboflavin when administered alone or in combination with vitamin E was effective primarily in relieving some of the photophobia and reducing the extent of circumcorneal injection and capillary proliferation. It appeared to have no effect, however, on the rate of absorption of corneal opacities and scars.

Stone suggests that vitamin E combined with vitamin B complex is a most valuable adjunct in the treatment of interstitial keratitis. He claims that it hastens the absorption of corneal exudates and opacities of long standing, prevents further organization of scar tissue in the cornea, and reduces excessive capillary permeability. The addition of riboflavin to the vitamin E is believed to enhance the action of the former by its beneficial effect on cellular oxidative processes in the cornea. If the patient has received ample treatment in the past, antisyphilitic therapy is apparently not needed to produce complete disappearance of the visual symptoms and corneal opacities of interstitial keratitis. Artificial fever therapy is of value mainly in preventing relapses and in producing more rapid amelioration of acute symptoms. It has little effect when administered alone on the rate of absorption of corneal opacities of long standing.

Confirmation of these results will be interesting.

REFERENCES.—¹*Publ. Hlth. Rep.* 1940, 55, 157; ²*Sth. med. J.* 1941, 34, 165; ³*Arch. Ophthal.* 1943, 30, 467.

DELINQUENCY. (See SOCIAL ASPECTS OF PSYCHIATRY.)

DENGUE-LIKE FEVER IN WEST AFRICA.

Sir Philip Manson-Bahr, C.M.G., D.S.O., M.D., F.R.C.P.

G. M. Findlay and R. W. Brookfield¹ have recently devoted considerable attention to the study of a dengue-like fever in Nigeria and the Gold Coast. This fever of 2–10 days' duration occurs sporadically and also in small epidemics and is by no means confined to the forest zone, and it has been seen both in Europeans and in Africans.

The fever resembles dengue in the saddleback type of temperature, the vague muscular, bone, and joint pains, and the measles-like rash which comes out from the 2nd to 6th day of illness. There is, however, often enlargement of the regional lymphatic glands.

The disease was reproduced in two volunteers by subcutaneous injection of serum after an incubation period of 5–6 days. Local species of monkey, as well as mice, guinea-pigs, and bush-rats proved refractory. As no organisms could be cultivated from the blood the authors suggest that the fever is due to a virus.

The serum of convalescent patients contained no virucidal antibodies to viruses of Rift Valley fever, Bwamba forest fever, or West Nile fever. The disease resembles what has been described as *fièvre rouge* of the French and Belgian Congos. It obviously resembles classical dengue in its clinical symptoms and in the fact that it can be transmitted to man whilst laboratory animals are refractory, but differs in the early appearance of the rash in two

cases. Enlargement of the lymphatic glands is a novel feature and on this account it was first thought to be German measles. It is therefore suggested that more than one dengue-like fever exists.

REFERENCE.—¹*Trans. R. Soc. trop. Med. Hyg.* 1943, 37, 95.

DE QUERVAIN'S DISEASE. (*See STENOSING TENDOVAGINITIS.*)

DERMATITIS, INDUSTRIAL. (*See CHEESE ITCH; INDUSTRIAL DERMATITIS.*)

DIABETES INSIPIDUS. (*See PITUITARY GLAND.*)

DIABETES MELLITUS.

Wilfrid Oakley, M.A., M.D., F.R.C.P.

Modified Insulins.—Advancement in the treatment of diabetes with insulin has continued along different lines but towards the same end, the discovery of a single insulin preparation which combines the virtues of regular insulin and protamine zinc insulin (P.Z.I.). One line has been the replacement of the protamine by a series of different proteins; this has led to the production of a number of new insulins for which various virtues have been claimed by their originators and to which reference has been made in the last two editions of the MEDICAL ANNUAL. More recently, however, one of these new modifications, *globin zinc insulin* (G.Z.I.), has been made available for clinical use in this country and therefore deserves special mention. The appearance of G.Z.I. on the market preceded the publication of any results of proper therapeutic trials in this country, the only account of its use being a brief record by R. D. Lawrence¹ of a few cases treated by him and the reviewer (W. G. O.). On the whole the publications and opinions expressed in America suggest that G.Z.I. has more action in lowering the blood-sugar from 4 to 12 hours after injection, and less from 12 to 24, than P.Z.I. Lawrence, however, points out that close study of the few protocols published in detail shows many irregularities and contradictions, and, when one discounts the bias in favour of something new, little real difference between the two insulins.

Comparing the action of similar doses of regular insulin, P.Z.I., and G.Z.I. in a moderately severe diabetic with marked ketosis, he found that the regular was by far the most active, neither P.Z.I. nor G.Z.I. gave evidence of any considerable liberation of insulin during the 24 hours, and there appeared to be little or no practical difference between the general trend of their action. G.Z.I. seemed to come into action more quickly (4–6 hours after injection), but its maximum effect is shown at 15 to 18 hours—no different from P.Z.I., and still making the night the most likely time for hypoglycæmia.

One of the chief objections to the introduction of this new insulin at the present time is the absence of any knowledge of what happens when it is mixed in the same syringe with regular insulin; this is important as it is a relatively weakly acting insulin, and so likely to require the addition of regular insulin in all but the mildest cases, for which, on account of its more prolonged action, P.Z.I. is probably the more suitable preparation.

In most of the American literature on the subject it is stated that, when G.Z.I. is given before breakfast, hypoglycæmia is most liable to occur in the afternoon, and the introduction of a mid-afternoon buffer meal is recommended to prevent this. In view of the somewhat shorter duration of its action, the bedtime feed, which is so necessary with P.Z.I., is better omitted with this insulin.

It is too early to pass judgement on G.Z.I., and more extended clinical trials are necessary before it will be possible to assess its value in the treatment of diabetes.

The second line of advance has consisted in the production and investigation of mixtures containing P.Z.I. and regular insulin in different proportions and prepared in different ways. A. R. Colwell, J. L. Izzo, and W. A. Stryker² studied such mixtures with a view to discovering the promptness, intensity, and duration of their hypoglycaemic action, and found that the addition of regular insulin to P.Z.I. produced an increase in every respect, the response depending, within limits, on the proportion of regular insulin present. These mixtures were relatively stable, the response being uniform in a given patient, and so predictable within the limits of error involved in any form of insulin therapy. They concluded that a suitable mixture can be more efficient for routine use than either insulin by itself or than both injected separately.

In a later paper Colwell and Izzo³ reported the results of routine treatment of some 60 diabetics with a mixture containing 2 parts of soluble insulin and 1 part of P.Z.I. for varying periods up to one year. The mixture either contained crystalline insulin and P.Z.I. mixed in quantity weeks before use and dispensed in ampoules, or regular insulin and P.Z.I. premixed in ampoules from market supplies, U.80 strength being used throughout. One injection of the mixture was given daily before breakfast, and the results analysed from three standpoints: average amount of glycosuria, frequency and severity of insulin shock, and irregularity of control. Definite improvement over previous forms of treatment was noted in almost every case in all three respects, the daily dose of insulin being reduced by 10 per cent.

C. M. MacBryde and H. K. Roberts⁴ have also reported results with a mixture of regular insulin and P.Z.I., having found that both histone zinc insulin and clear protamine zinc insulin were inferior in treatment to standard P.Z.I. On theoretical grounds it seemed desirable that, in order that the mixture should be standard and at the same time suitable for the greatest possible number of diabetics, the proportion of P.Z.I. to regular insulin should be made to conform to the average ratio required by a large series of patients on combined therapy. This was found to be 3 parts of P.Z.I. to 1 part of regular insulin when these insulins were injected separately but at the same time.

A mixture with this ratio was found to result from mixing equal quantities of P.Z.I. and regular insulin and adjusting the pH to 7.2. Thus when 30 units of each insulin were mixed and centrifugalized the supernatant fluid was found to give the same insulin depression curve as 15 units of regular insulin, the remaining 45 units being in the form of P.Z.I.

Clinical trials were carried out both on patients in the Metabolism Ward and on out-patients, and improvement in control was observed in the majority of both series as a result of substituting one injection of the standard mixture for either a single dose of P.Z.I. or separate injections of P.Z.I. and regular insulin. The authors conclude that 2 insulins only should be sufficient, namely, the modified P.Z.I. which should replace standard P.Z.I., and regular insulin for use in emergencies and whenever supplementary insulin is necessary.

In the same connection F. B. Peck⁵ has worked out the approximate insulin content of extemporaneous mixtures of insulin and P.Z.I. His results are expressed in the form of a table from which it is possible at a glance to determine the approximate relative proportion of rapidly-acting and slowly-acting insulin present in a given mixture. It provides a quantitative starting point in making individual readjustments in the direction of greater or lesser insulin activity and duration of effect. The figures are to be regarded as only approximate, and the greatest consistency of results should be obtained by using the same product in the same proportions, and, if possible, the same concentrations.

COMMENT.—For the past 6 years it has been recognized in this country that P.Z.I. by itself is effective only in mild diabetics, more severe cases requiring

the addition of regular insulin to control glycosuria and prevent ketosis. The appreciation of this fact has led to the early use of P.Z.I. and regular insulin in the form of mixtures, a description of which was given in 1937 by R. D. Lawrence and N. Archer,⁶ the similar use of retard or delay insulin and regular insulin being described by G. Graham⁷ in 1938.

Briefly, in this country it has been the custom to work out the particular combination of P.Z.I. and regular insulin which gives the best control in each individual case, without paying over much attention to the chemical and physical changes which result from the introduction of these widely different substances into the same syringe. At the same time the fact that mixing results in the precipitation of a certain amount of the soluble insulin by the excess of protamine present in the P.Z.I. has been fully realized, and the dose of regular insulin in consequence generally found to exceed that of the P.Z.I. It is, however, important to realize that, in spite of theoretical considerations, in an appreciable number of diabetics on mixed doses the best control is obtained when the dose of P.Z.I. equals or exceeds that of regular insulin, and that the action of such mixtures is not the same as that produced by a single dose of P.Z.I. equal in size to the mixed dose, which would be expected if all the regular insulin were converted into P.Z.I. The reason for this is not clear, but the observation is in keeping with that made by Colwell and Izzo, who found that the supernatant fluid from their mixture of 2 parts regular and 1 part P.Z.I. showed negligible activity for insulin in solution. They suggest the probability of a compound which does not depend on a component of simple precipitated insulin for its accelerated effect.

'Alloxan Diabetes'.—As long ago as 1932 H. L. Sheehan discovered that the synthetic compound styryl quinoline produced necrosis of the islets of Langerhans in rabbits with hyperglycæmia, followed by collapse and death. In 1937 H. R. Jacobs⁸ found that similar lesions could be produced in the islets of rabbits by the intravenous injection of alloxan, the ureide of mesoxalic acid and a component of the uric acid molecule. This observation has recently been confirmed by J. Shaw Dunn, H. L. Sheehan, and N. G. B. McLetchie,⁹ who studied the effect of alloxan in a series of rabbits and correlated the pathological, biochemical, and clinical findings. The average dose varied between 200 and 300 mg. per kilo of body weight, and in all cases produced some degree of islet necrosis, which was generally extensive, the stage of necrobiosis depending upon the period of survival. In one animal killed at 5 days very few cellular islets could be recognized, but shrunken remains of necrosed islets could with difficulty be identified, one or two live cells persisting at the margins. Histological changes elsewhere in the body were remarkably scant and insignificant.

The blood-sugar after alloxan was found typically to rise for 1 or 2 hours, reaching 380 mg. in one instance, and then to fall in 3 to 5 hours to 100, 50, or even 30 mg. per cent. Clinically the rabbits showed a marked fall in temperature, followed later by collapse, slow feeble respiration, and death in hypoglycæmic coma.

The authors considered that the selective islet damage was probably the result of extreme hyperfunction and over-strain following over-stimulation, the initial hyperglycæmia being due either to excessive mobilization through the adreno-sympathetic or to diminished combustion from lack of insulin. At the time of death, however, and that may be within 12 hours, necrosis of the islets was found to be constantly associated with severe hypoglycæmia, the reverse of what would be expected if the necrosis had been the primary event. To account for this it is suggested that insulin production must for a time have been at least sufficient and probably excessive, implying the existence of some live and functioning islet cells whose necrosis represents a terminal failure ;

an alternative possibility, put forward by C. C. Bailey and O. T. Bailey,¹⁰ is that islet necrosis releases a relatively large amount of insulin.

The tentative suggestion is made that alloxan, or a purine which contains it, may be a natural hormone of muscle discharged into the blood proportionately to muscular activity and catabolism, and that through this agency the islets are normally stimulated and their activity regulated. Some such chemical interaction might account for the rapid regulation of blood-sugar which is normally maintained in spite of vast changes which can occur in the rates of storage and combustion of carbohydrate.

These observations have been carried a stage further in rabbits by Bailey and Bailey, and in rats by Dunn, Sheehan, and McLetchie,¹¹ who both succeeded in overcoming the hypoglycæmic phase by means of glucose injections, thus enabling the later effects of alloxan to be studied in some detail. After a period of hypoglycæmia, lasting from 12 to 24 hours all 6 rabbits developed severe diabetes which persisted in 5 over 2 weeks' observation during which blood-sugar levels ranged from 360 to 700 mg. per cent. Polydipsia and polyuria were present in all cases, and one rabbit, not given insulin, developed acetonuria and marked lipæmia. In the 2 rabbits examined after death, all the cells, alpha and beta, of all the islets had completely disappeared, but there were no significant changes in the rest of the pancreas.

Comparable results were obtained in rats, in which necrosis was observed in the renal tubules as well as the islet tissues, other organs, including the liver, being unaffected. Glycosuria could in all instances be controlled with insulin, and, when withheld in 2 animals, loss of weight was followed by acetonuria and death in coma.

The importance of these experiments at present appears to lie rather in the rapid and simple method they afford for the production of experimental diabetes in small animals than in any possible aetiological relationship between this condition and human diabetes. It is true that in certain cases of diabetes the only histological change in the pancreas seems to be a reduction in total amount of islet tissue and that a similar appearance may be produced experimentally by alloxan, but the characteristic lesions described in the human disease—sclerosis, hyalinization, and hydropic changes—have not been seen in so-called alloxan diabetes. The experimental condition produced by F. G. Young by injection of anterior pituitary extract, from the histological point of view, much more closely resembles human diabetes, but, even so, there is no conclusive evidence that the latter is commonly due to a pituitary lesion.

Venous Retinal Changes in Diabetes.—In an article on recent work on vascular disease and its significance in medical ophthalmology, A. J. Ballantyne¹² has drawn attention to the importance of venous retinal changes in diabetes. The occurrence of the more unusual loops and networks of large-calibred vessels in so many diabetics is considered as evidence of a distinct clinical entity, and a manifestation of a specific but undefined systemic disorder in which diabetes is an important factor. Sclerosis and degenerative changes affecting the retinal arteries are common in hypertension, the veins being relatively unaffected; in diabetes the changes are most marked in the veins, and arterial sclerosis is no more pronounced than in non-diabetics of corresponding ages. This view is opposed to the older one according to which diabetic retinitis is essentially a result of arteriosclerosis and hypertension, but is strongly supported by the undeniable fact that the most severe retinal changes may be seen in diabetics without hypertension or any other evidence of arterial disease.

One of the earliest retinal changes is an abnormal fullness of the veins, which may be followed by irregular and easily recognized beading of the larger veins with the production of loops which, histologically, are found to be pre-retinal

as well as retinal. The interference in venous flow shows itself in secondary retinal changes, of which the commonest are the characteristic punctate hæmorrhages of diabetic retinitis; these are deep-seated, and apparently derived from the post-capillary venous radicals. Although partial obstruction with increased venous pressure is an essential feature, gross obstruction, such as occurs in thrombosis of the central vein, is not often seen.

The types of venous changes described are considered by Ballantyne as probably pathognomic of diabetes, and are quite unfamiliar in the very numerous cases of hypertension.

Relation of Trauma to Diabetes.—The importance of trauma in relation to diabetes has been considered in detail by Elliott P. Joslin¹³ in an article which not only puts both sides of this somewhat controversial subject but also includes references to most of the important publications on it. After stressing the necessity for accurate diagnosis, with special reference to the failure of most early writers to distinguish between diabetes and renal glycosuria, the author emphasizes certain fundamental facts concerning diabetes which have a direct bearing on the subject. Diabetes is an hereditary disease; no age, sex, race, or social status is immune from it; its incidence is increasing; and its onset, which occurs most commonly between 45 and 55, is usually gradual, but may be sudden and acute.

To prove that trauma is the cause of diabetes in any individual case there must be evidence: (a) that the disease did not exist before the trauma; (b) that the trauma was severe, injuring the pancreas; (c) that the symptoms and signs of the disease developed within a reasonable period following the trauma, the aetiological importance of the trauma waning with the prolongation of the interval; and (d) that the symptoms and signs of diabetes were not transitory but permanent. In Joslin's experience the number of cases which have fulfilled these conditions is infinitesimal, even the few cases in the literature being open to criticism.

That trauma might produce diabetes indirectly by injury to the pituitary or suprarenals is theoretically possible, but there is no good evidence that this in fact occurs, and a series of 3000 cranio-cerebral injuries is quoted in which neither diabetes nor glycosuria had resulted by the time the patients left hospital.

The third possibility, that diabetes may result from psychological trauma, may be considered to have been ruled out by the experiences of the last and the present war, in which the incidence of diabetes among the fighting services has been remarkably low—Joslin saw 3 cases among 38,765 soldiers at Mesres hospital centre, and in none was there any indication that the disease was related to psychic or organic trauma.

While the production of diabetes *de novo* by trauma must be exceedingly rare, the activation of latent diabetes by trauma is probably not so uncommon. In this connection the presence of hereditary susceptibility, age of high incidence of diabetes, obesity, reduced exercise, and infection is important, the stout middle-aged patient with a carbuncle as a result of minute trauma being a familiar example. In this group of cases it is often the indirect effect of the accident rather than the direct trauma which causes the trouble.

The incidence of trauma in the course of diabetes is analysed, and the importance of arteriosclerosis, neuritis, and infection in lesions of the lower extremities emphasized. In conclusion the author draws attention to the remarkably small number of accidents which occur in connection with the use of insulin either as a direct result of injections or indirectly as a result of hypoglycæmic reactions.

Ketosis.—The old view that ketone bodies represented incomplete oxidation products of fatty acids which required the concomitant oxidation of carbohydrate for their utilization, and the idea of a quantitative relationship between the

oxidation of ketone bodies and glucose, so-called 'ketogenic-antiketogenic ratio', have recently been replaced by a more simple and convincing theory. It is now believed that the oxidation of ketone bodies is uninfluenced by the presence or oxidation of glucose, and glucose is no longer held to exert a ketolytic action. This modern conception is reviewed by E. M. McKay¹⁴ in an article on the significance of ketosis.

As a result of perfusion experiments it has been shown by several observers, and recently confirmed by W. C. Stadie, J. A. Zapp, jun., and F. D. W. Lukens¹⁵ that much of the total energy requirements can be provided by the oxidation of ketone bodies. Ketosis must therefore be looked upon as a physiological mechanism in which a special type of fat metabolism comes into play. Ketone bodies are produced in the liver by the oxidation of fatty acids and carried in the blood-stream to the muscles and other tissues where they are used as a source of energy. With the exception of the brain all the other extra-hepatic tissues appear to be able to use ketone bodies for this purpose. Glucose and the ketone bodies comprise a special source of energy which has been called "quick fuel", and the onset and extent of ketosis are dependent upon the demand for this and the shortage of glucose. If available, carbohydrate is predominantly and preferentially used for metabolism, but, if there is a shortage of carbohydrate, this alternative mechanism comes into operation with the production of ketone bodies to act as fuel for the tissues, especially the muscles. The shortage of carbohydrate may be absolute as in starvation, or relative as in diabetes in which the tissues are unable to utilize glucose. M. Somogyi and T. E. Weichselbaum¹⁶ have summarized the factors which increase and decrease respectively the degree of ketosis as shown by the level of ketone bodies in the blood. "Ketosis is increased by: (1) de-glycogenation of the liver, entailing an increase in its fat catabolism; and (2) decrease in rate of ketone utilization in extra-hepatic tissues." Conversely "ketosis is decreased by: (1) increased carbohydrate utilization in the liver which depresses fat catabolism; and (2) increase in rate of ketone utilization in extrahepatic tissues."

The exact nature of the chemical process by which ketone bodies are formed in the liver is still uncertain, but it is now thought unlikely to be β -oxidation, an alternative possibility being 'multiple alternate oxidation', whereby one molecule of fatty acid yields four of ketone bodies.

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DICOUMARIN. (See also BLOOD-VESSELS, SURGERY OF.)

Stanley Davidson, M.D., F.R.C.P.

H. W. Fullerton, M.D., M.R.C.P.

In last year's MEDICAL ANNUAL a short review was given of the work done regarding this substance, which lowers the prothrombin content of blood plasma and thereby reduces the coagulability of blood. Since then several papers have appeared which confirm the results already reported and in addition describe the effects of the compound in preventing venous thrombosis. E. V. Allen, N. W. Barker, and J. M. Waugh¹ used dicoumarin in 374 patients and were impressed by its usefulness in preventing intravascular thrombosis. In 67 cases of post-operative pulmonary embolism treated by the drug subsequent thrombosis or embolism occurred in only two and in both of these the dosage was thought to be inadequate as judged by the effect on the prothrombin level. According to the authors subsequent thrombosis or embolism would have

been expected in 29 of the 67 cases if no anti-coagulant therapy had been employed. W. L. Butsch and J. D. Stewart² were impressed by the effectiveness of dicoumarin in preventing post-operative venous thrombosis in a series of 130 patients. They advise against its use when granulating or ulcerating lesions are present, and point out that hæmatemesis occurred in 2 out of 4 patients with inoperable carcinoma of the stomach to whom the drug was given, with a fatal result in one of the cases.

It is generally agreed that when dicoumarin is given the plasma prothrombin should be determined each day and the dosage should be governed by the results of these determinations. The danger to be avoided is of course the production of a hæmorrhagic state through excessive lowering of the prothrombin level. The ineffectiveness of vitamin K in counteracting this complication has been confirmed. Withdrawal of the drug and transfusion of fresh blood constitute the proper treatment.

The papers referred to above and others on similar lines indicate that dicoumarin is undoubtedly effective in reducing the coagulability of the blood, and that we may expect in the near future many more reports of its use particularly in patients with a liability to venous thrombosis. In this way we may reasonably expect to learn whether its routine use in patients after surgical operation is justified. Obviously much more experience is necessary before definite conclusions can be drawn.

The compound is now available commercially, but its use should be restricted to hospital practice because of the repeated estimations of the prothrombin level which are necessary if doses are to be given which are at the same time effective and safe.

REFERENCES.—¹J. Amer. med. Ass. 1942, 120, 1009; ²Ibid. 1025.

DIPHTHERIA.

H. Stanley Banks, M.A., M.D., M.R.C.P., D.P.H.

Epidemiology.—The diphtheria cases notified in England and Wales numbered 41,404 in 1942, compared with 50,797 in 1941 and 46,281 in 1940. This is the lowest recorded figure since 1923. The number of deaths in 1942 was 1826, a new low record and some 300 fewer than the previous low record in 1939. Deaths in 1941 were 2641, and in 1940 were 2480. The decrease in recorded cases and deaths, while suggestive, cannot yet be ascribed wholly to the immunization campaign; it may be due partly to the periodicity of the infection.¹

Active Immunization.—The total children aged 0–15 years immunized under arrangements made by local authorities was 3,748,257 at the end of 1942. Taking other factors into account it is probable that by that date over half the child population (aged 0–15 years) had been protected. It is calculated that the incidence of diphtheria amongst the immunized was one-quarter to one-fifth of that among non-immunized children, and that the unprotected child was from 20 to 30 times as liable to die of diphtheria in 1942 as the immunized child.¹ Sir Alexander Russell² estimates that towards the end of 1941 approximately 71 per cent of the school children and 56 per cent of the pre-school children in Scotland had been inoculated; the rate of inoculation, however, seriously decreased in 1942. Observations from various areas show that a change from *mitis* and *intermedius* to *gravis* infections occurred in Scotland about the year 1940, and that the latter is now the predominating organism throughout a considerable part of the country. The 1940–41 diphtheria epidemic was clinically severe and associated with heavy mortality, especially in 1940, but in 1942–43 there was a steep fall in mortality. A marked increase in the incidence of diphtheria in the 'over 15 years' groups has taken place within the last 3 years. In 1941–42 the immunized child was eight times, and the immunized pre-school child twenty times less prone to an attack of diphtheria

than the non-immunized. As regards deaths, the immunized child had over 100 times more chance of recovery from diphtheria than the non-immunized.

V. K. Volk and W. E. Burney³ examined 808 children *re-immunized* for diphtheria. They show that in children immunity is not permanent; the antitoxin content of the blood undergoes a slow but definite and progressive reduction. Re-immunization with one small dose of toxoid or A.P.T., especially the latter, is extremely effective. Children immunized in infancy should be re-immunized after five or six years, e.g., on entry to school.

Diphtheria in the Inoculated.—J. G. M. Bullowa and Margaret Scannell⁴ comment on the frequency of inadequate diphtheria immunity in New York. In a sample group of 200 children aged 1–16 years who had previously been immunized, 24 per cent were found to be Schick-positive. Partially immunized patients admitted to hospital with diphtheria amounted to one-third of the total. The illness in such cases can be severe, and it is a mistake to withhold antitoxin because of a history of immunization. Schick tests should be done after immunization so that, if necessary, the immunization may be fortified by extra dosage. C. Nebauer⁵ describes 50 cases of diphtheria in inoculated persons. There were 12 cases in which the exudate resembled follicular tonsillitis; in 18 cases there was a single small patch of membrane on one or both tonsils; in 9 cases a combination of these lesions was present; in only 10 cases was the whole surface of both tonsils covered with deposits. In contrast with ordinary diphtheria, membrane spreads slowly and rarely involves the faucial pillars or soft palate; it can usually be wiped off without bleeding; in only one-quarter of the cases was the membrane firmly adherent. In 6 cases a mild myocarditis, in 2 cases paralysis of the soft palate, and in 4 cases absence of knee-jerks supervened. *Gravis* infections accounted for 78 per cent of the cases, *intermedius* for 18 per cent, and *mitis* for 2 per cent. [Diphtheria in the inoculated is not essentially different from the ordinary diphtheria which occurs in persons who have become partially immunized by natural means. Its incidence has recently increased *pari passu* with the number of inoculated children in the population. It is now obvious that two doses of A.P.T. either fail in a significant proportion of cases to produce a sufficiently solid immunity (although the Schick test may be negative for a time), or that the immunity so produced is not sufficiently lasting. The time has come to revise the technique of immunization. There is much to be said for a third dose of A.P.T. as a routine, or at least in those who are still Schick-positive after two doses. There should also be a definite plan for re-immunization of young children after 3–5 years.—H. S. B.]

Diphtheria in Northern Palestine.—J. D. S. Cameron⁶ describes an interesting outbreak of diphtheria among the troops in Sinai and Palestine. It may be recalled that the disease was similarly prevalent in that region during the last war. The outbreak comprised nasal, faucial, and cutaneous cases and carriers. The source of infection was believed to be endemic diphtheria amongst the Jewish children of Palestine. The possibility of infection from horses or their forage was investigated and it was concluded that the horse played no part in the spread of the disease. The signs in the nasal cases comprised muco-purulent or muco-serous secretion, crusting, and recurrent small epistaxis; the crust or membrane quickly formed after detachment. These cases often showed also acute cutaneous lesions, usually on the back of the right hand or radial aspect of the right wrist and lower forearm. Contrary to the usual experience this nasal diphtheria was commonly followed by paralysis and polyneuritis—evidence of considerable toxin absorption probably due to delay in diagnosis. The sequelæ amongst 106 cases of all forms included frequent sensory phenomena—tingling in hands and feet and imperfect sensation in the finger-tips; motor paralysis in 27 cases (17 per cent) including palatal paralysis in 10 cases, ciliary

paralysis in 8, facial paralysis of Bell's type in 4; polyneuritis of all parts of the body, usually occurring late and sometimes after the return of the patient to full duty. Treatment by diphtheria antitoxin in average dosage of 24,000 units was successful. Vitamin B₁ was given by injection to all cases of neuritis without striking effect on the paralysis, although the sensory impairment usually cleared up in a week. It is suggested that all troops in the Middle East should be actively immunized against diphtheria. In one regiment, after 6 months' continuous crop of cases, the whole of the personnel were immunized, and this brought about a complete cessation of clinical cases. By way of contrast, in another regiment where isolation and swabbing alone was practised, sporadic cases continued to occur.

Cutaneous Diphtheria.—J. D. S. Cameron and E. G. Muir⁷ in another article on the same outbreak describe particularly 66 cutaneous cases, 24 of which had nasal or faucial diphtheria in addition. There were two forms, acute and chronic. The acute form was always associated with a lesion in throat or nose. It commenced as a small blister or pustule centred round a hair follicle; after rupture a flat shallow sore developed with a base almost flush with the skin. The chronic form usually consisted of multiple sores on the elbows, forearms, backs of hands, knees, legs, and ankles. The sores were circular or oval punched-out chronic ulcers with hard rolled bluish edges and a dark-scabbed and leather-like base, beneath which pus exuded. Diagnosis depends on careful smear-taking and adequate bacteriology. The slough membrane must first be removed by moist saline dressings for 24 hours, or (in out-patients) by a spirit swab applied for half an hour. The smear should be taken by scraping the surface under the margins with a platinum loop. The tellurite medium should be employed as a routine and usually also other bacteriological tests, since diphtheroids abound in skin sores. In many cases the diphtheritic infection supervened on staphylococcal lesions, folliculitis, boils, and desert sores. The general treatment was antitoxin. Local treatment included (1) preliminary removal of the slough by hot fomentations, magnesium sulphate in glycerin, sodium sulphate compresses or hydrogen peroxide, and (2) dressings which did not stick to the sore, e.g., cod-liver oil. Locally applied sulphonamide powder did not appear to be effective. The chronic sores usually took about a month to heal. Amongst the 42 cutaneous cases unassociated with diphtheria elsewhere, 5 developed paralysis. The authors remark that apart from articles by F. M. R. Walshe⁸ and by H. J. Bensted,⁹ the association of paralysis with skin diphtheria does not appear to have been emphasized.

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DIPHTHERIA : EPIDEMIOLOGY AND ADMINISTRATION.

Ralph M. F. Picken, M.B., Ch.B., B.Sc., D.P.II.

W. T. Russell¹ has investigated a number of epidemiological problems of diphtheria, some of which may be briefly summarized.

Mortality.—The death-rate from diphtheria in England and Wales has fallen by 60 per cent in the last 40 years. In comparison, the rate among children aged 1–15 in the U.S.A. has been reduced by 80 per cent in 18 years from 1920 to 1938. In densely populated London boroughs the ratio of the mortality under 5 years of age to that at 5–15 has fallen very greatly over 30 years, whereas in better-class districts it has remained almost constant. It is suggested that the fall of the birth-rate and improved hygiene have reduced the risk of infection at young ages among the poor so that they reach school age with greater susceptibility. In U.S.A. mortality is falling more quickly at school

than pre-school ages, corresponding with the early concentration on immunization at the former ages.

Prevalence.—The notification-rate in England and Wales increased between 1921 and 1934, especially in the north. This is partly due to more accurate notification but also to a greater tendency to notify on suspicion of the disease. For instance, in London unconfirmed diagnoses rose from 15 per cent of admissions in 1901–2 to 23 per cent in 1928–9. In 1941 it reached 50 per cent at one London hospital. Recent Liverpool experience showed a diagnostic error of 33 per cent. There has also been some change of age-incidence. In densely populated London boroughs it remains, like mortality, highest at pre-school ages; but when the social grades affected are examined, it is found that the incidence among persons over 5 years of age in the poorest class is now higher than in the best, a reversal of the position before 1913. The explanation is the same as that suggested for the corresponding change in age-mortality.

New York and Toronto Figures.—The decline of incidence following mass-immunization, the correlation of which has been questioned, is carefully examined. The difference between the actual and expected rates since 1928 in New York and 1931 in Toronto is great and has increased with time. Moreover, study of the previous periodicity of diphtheria in these two large cities would lead one to expect that more than one major epidemic would normally have occurred after 1930, but both cities have escaped. The evidence in favour of immunization is convincing.

Immunization in England and Wales.—Examination of the records of 1940–41 shows that certain large towns with low rates of immunization of children have high case-rates. Some of these have also exceptionally high death-rates.

Types of Infection.—The *gravis* type of *C. diphtheriae* was prevalent throughout England and Wales in 1941 as determined at E.P.H. laboratories, the proportions varying from place to place. In 14 out of 20 laboratories the percentage of cultures shown to be of this type ranged from 41 to 84. All the northern and some of the southern centres were included in this group. The proportion changes from year to year. In 6 out of 7 laboratories furnishing data both for 1940 and 1941 the difference between the two years was significant. Possibly a high level of immunization increases the relative frequency of *mitis* infection. Such evidence as is available does not lead to the conclusion that *C. diphtheriae gravis* necessarily causes a high rate of fatality in every area where it occurs.

Administrative Control.—J. A. Scott² reports that more than half the children under 15 years of age have now been immunized in Fulham and that cases have dropped from an annual average of 350 to 50. The success of immunization is verified by subsequent Schick test. Twenty-two persons subjected to immunization have been reported as suffering from the disease. Immunity had not had time to develop in 5, in 6 the diagnosis was not confirmed, and in another 5 no information was available. Of the remainder, 4 cases were mild, one severe, and one (which had escaped Schick verification) died. To secure prompt treatment of diphtheria he advocates admission to hospital on suspicion, without notification. In any case, notification statistics are unreliable; a system of correction of diagnosis for statistical purposes should be adopted.

N. D. Begg³ states that of 1058 cases admitted to hospital only 46 per cent were clinically obvious and another 13 per cent were confirmed after complete investigation. As many as 40 per cent (including carriers, 5 per cent) were not suffering from diphtheria. The highest ratio of error is among patients from hospital out-patient departments. While it is important to admit at an early stage of disease and without waiting for bacteriological confirmation, the segregation in hospital of these problem cases places a heavy burden on

administration. He advocates a clinical consultant service backed by laboratory facilities to see patients in their homes before admission.

R. Cruickshank⁴ considers that erroneous admissions would be largely eliminated by domiciliary administration of antitoxin pending a bacteriological report. Even in hospital the clinical diagnostic errors are about 10 per cent, and he pleads for much greater and better laboratory facilities in infectious disease hospitals. The use of tellurite medium, as well as Loeffler slopes, and of blood-agar plates for detection of streptococci, should be routine. Bacteriological determination of freedom from infection should be quick, in order to reduce the risk of cross-infection with other types of other micro-organisms. Careful bacteriological investigation of all admissions, combined with precautions such as oiling of floors and bed-linen, would also reduce the risk of cross-infection.

Diphtheria in Immunized Children.—C. J. McSweeney⁵ reports that 133 (23 per cent) of 581 cases of diphtheria admitted to hospital in Dublin in 1942 had been immunized. The figure excludes carriers, all cases inoculated less than three months previously, and 15 who had received only one injection of A.P.T. Three immunized children died, one of these being complicated with scarlet fever. When the cases were graded according to severity there was some advantage to the immunized and the proportion suffering from post-diphtheritic paralysis or severe cardiovascular failure was substantially less. It is suggested that the prophylactics in use are not fully effective against the strains of *C. diphtheriae* prevalent in Dublin. J. C. Gaffney,⁶ also writing from Dublin, records that by the end of 1942, of 9383 children treated with three injections of T.A.F. in 1934, 78, or 8.4 per 1000, had contracted diphtheria; of 30,180 receiving one injection of A.P.T. in 1935, 219, or 7.3 per 1000, and of 11,193 receiving one injection of A.P.T. in 1936, 109, or 9.8 per 1000, had contracted the disease. Comparing the effect throughout two years after immunization with one and two injections of A.P.T. he is unable to demonstrate any difference in the protective effect. Although 75 per cent of the child population of Dublin had received immunizing injections by the end of 1941 the incidence of diphtheria in Dublin during 1943 has been higher than ever before (but see Russell and Scott, *above*).

Propaganda for Immunization.—A committee of the Royal College of Physicians for the study of social medicine⁷ has published the results of inquiries made by hospital almoners throughout England and Wales as to the knowledge of mothers about immunization and their reactions to propaganda. The inquiry covered 3860 mothers with 7596 children under 14 years of age. Of the 3860, 3569, or 92 per cent, had heard of immunization. Of those with children of immunizable age 45 per cent had had all their children immunized, but 40 per cent had done nothing about it. By far the majority had gained their knowledge through schools or child welfare organizations. Private doctors, direct circularization by health authorities, child welfare organizations, and schools had proved the most effective agents as measured by the proportions of children immunized in these families. It is suggested that effort should be concentrated through these channels. For special appeals newspapers and the radio should continue to be used, but posters and films are not regarded as justifying their cost.

Umbilical Infection in the Newborn.—J. Greenwood Wilson and V. D. Allison⁸ have described an outbreak of diphtheria in a maternity home. It was discovered when a mother sickened of diphtheria on August 9, 1942, and her baby, born on July 14, was found to have had snuffles since July 20. Swabs from the mother's throat and from the nose and throat of the baby contained *C. diphtheriae intermedius*. The baby died. Two other babies had chronic infection of the umbilical stump, one beginning 10 days after birth (born July 7), the other 12 days after birth (born July 22). Swabs from both gave *C. diphtheriae*

intermedius and they cleared up quickly under antitoxin treatment. A nurse who had been associated with a previous outbreak elsewhere and then found to be a carrier of the *intermedius* type had joined the staff 5 weeks before the first umbilical infection. She was again found to be a carrier of this type of organism. Throughout her career, as known to the writers, the micro-organisms were sparse, intermittent, and mainly nasal. She was in attendance on all three babies at the relevant times and also on a woman who developed vaginal discharge on July 16, i.e., 5 days after confinement. This condition had cleared up before the investigation and swabs were negative, but it may also have been a diphtheritic infection.

Vulvar Infection.—For comparison with the above cases an account by J. B. Fleming⁹ of extensive infection with diphtheria of a woman recently confined is interesting. Her illness began two days before labour with discomfort in the mouth and difficulty in swallowing, and also discomfort at the anus. On admission to hospital the day after confinement, extensive membrane had formed on the floor of the mouth but not on the inflamed throat. An area of two inches round the anus was covered with thin grey slough or membrane and the sulci between the major and minor labia of the vulva were extensively involved, the membrane later invading the vagina. Smears revealed the presence of *C. diphtheriae* (type unstated) but no evidence of Vincent's angina. Later her baby and a female relative were admitted with, in the one case nasal and faucial, and in the other faucial, diphtheria caused by *C. diphtheriae intermedius*.

REFERENCES.—¹*Spec. Rep. Ser. med. Res. Coun., Lond.* No. 247, 1943; ²*Publ. Hlth., Lond.* 1943, 57, 14; ³*Ibid.* 15; ⁴*Ibid.* 17; ⁵*Dublin Fev. Hosp. Bd., Ann. Rep.* 1942; ⁶*Lancet*, 1943, 2, 621; ⁷*Ibid.* 1943, 2, 642; ⁸*Emerg. pub. Hlth. Lab. Serv., Mon. Bull.* 1943, 2, 13; ⁹*Brit. med. J.* 1943, 2, 677.

DIVERTICULITIS OF THE COLON. (See also COLON, SURGICAL DISEASES OF.) W. B. Gabriel, M.S., F.R.C.S.

Proctoscopy and Sigmoidoscopy.—R. L. Jackman and L. A. Buie¹ describe the assistance given by proctoscopy and sigmoidoscopy in cases of diverticulitis. The following five proctoscopic signs may determine or lead to the strong suspicion of diverticulosis or diverticulitis :—

1. Limited mobility of a segment of bowel which is normally freely mobile.
2. Sharp angulation of the bowel preventing advancement of the sigmoidoscope.
3. Reduced lumen, adherent mucosal folds, and oedema of the mucous membrane.
4. Sigmoidal sacculation—this is seen as shallow pouching with ridge-like elevations in between.
5. Visualization of one or more diverticula, which may contain inspissated faeces.

Sigmoidoscopy is also of value after a colostomy has been performed, the instrument being passed down the distal colonic stoma as well as per rectum. A series of 50 cases treated by colostomy on account of an obstructive lesion in the lower pelvic colon, gave positive sigmoidoscopic evidence of diverticulitis in 37 (74 per cent). In many cases the examination had to be repeated, and it was often found that a loop of colon at first inaccessible on account of fixation and inflammation, subsequently became more mobile and amenable to satisfactory examination.

REFERENCE.—¹*J. Amer. med. Ass.* 1943, 121, 1144.

DROPLET-BORNE INFECTION, PREVENTION OF.

Ralph M. F. Picken, M.B., Ch.B., B.Sc., D.P.H.

In a review of the present state of our knowledge as to the prevention and control of colds, influenza, and pneumonia, C. S. Keefer¹ points out that

colds promote immunity lasting on the average only seven weeks, and that most people, especially the young, are susceptible at each of the three seasons of prevalence, viz., Jan.-Feb., April-May, and Sept.-Oct. Carriers seem to be rare. The micro-organism is almost certainly a filtrable virus, and its introduction is more important than climatic factors, though there is evidence that cold weather may activate the virus after its presence has failed to produce an epidemic for weeks beforehand. Vaccines made from common organisms of the respiratory tract have failed to prevent colds, nor do they lessen complications except where given repeatedly over a long time. In the case of influenza, certain viruses (A and B) having been identified, vaccines prepared from them call forth an antibody response, but they do not completely protect against the disease. Keefer thinks, however, that they give considerable promise. In the meantime *ultra-violet radiation* and *propylene glycol vapour* spray as preventive measures deserve extended trial in communities to which their application is practicable. In pneumonia carriers are more important than cases as sources of infection, and no means of control has been found. It must depend on avoidance of overcrowding, public education, isolation of cases, destruction of discharges, early diagnosis, and prompt and adequate treatment.

Hypochlorite Sprays.—D. G. ff. Edward and O. M. Lidwell,² continuing their study of the lethal effect of hypochlorous acid on influenza virus, have atomized suspensions of virus A and exposed mice (*a*) to this aerosol mixed with an equal volume of air as a control, and (*b*) to the aerosol mixed with air into which hypochlorite had been sprayed or hypochlorous acid had been introduced. The results show that the air-borne virus is at least as easily killed by hypochlorite mists as *Strept. salivarius*. It is also killed by hypochlorous acid itself in the atmosphere, a concentration of 1 in 2 million by volume being 99 per cent lethal if the proportion of virus particles in the air is not high. Preliminary experiments indicate that exposure to this concentration of hypochlorous acid for 16 days has no toxic or local effect on mice, but that higher concentrations produce acute irritation of the mucous membranes, without, however, making the animals more susceptible to influenza.

Ultra-violet Radiation.—In experiments on the effect of U.V.R. in killing influenza virus, vaccinia virus, and the virus of herpes simplex, D. G. ff. Edward, D. Lush, and R. B. Bourdillon³ used a technique somewhat similar to that employed in testing the lethal power of hypochlorites. The survival of vaccinia and herpes virus was tested by growth on the chorio-allantoic membranes of eggs; of influenza virus by exposure of mice to treated and untreated aerosols of the virus. A Hanovia lamp and a "Sterilamp" were used, emitting U.V.R. of 2537 Å. wave-length. Exposure for 6 seconds at 2 cm. was 99 per cent lethal to influenza virus. At the same distance U.V.R. killed 99 per cent of vaccinia virus after 1 second, and 90 per cent after 0.5 second. The experiments with herpes virus gave irregular results but suggested a similar sensitivity. The view is therefore supported that such lamps may effectively reduce air-borne respiratory infections.

E. C. Robertson, M. E. Doyle, and F. F. Tisdall⁴ describe the results of a trial of U.V.R. for the protection of infants under six months of age from droplet infections in a children's hospital in Toronto. Open-door cubicles, otherwise completely separated, were fitted with a screen of ultra-violet light across the doorway and ventilated by a mechanical air-changing system with U.V.R. lamps in the ducts. Controls were an ordinary ward ventilated by windows, and a similar ward with partitions between beds not reaching to the ceiling. The experiments extended over two and a half years. Infants treated in the control rooms developed respiratory infection twice or thrice as frequently as those in the special cubicles. During nine months when the U.V.R. lamps

were turned off but other factors were constant, there were only slightly fewer infections in the special cubicles than the control rooms. The U.V.R. curtains were therefore the predominant influence. Irradiation of the upper air of small rooms holding 3 or 4 cots or cribs failed to reduce the spread of infection in them, except in the case of rooms used for premature babies, the doors of which were always kept closed. Plate and Wells centrifuge counts revealed that the special cubicles harboured many fewer bacteria per cubic foot than the control wards, that frequently opened small rooms with irradiation of the upper air had no fewer bacteria than similar rooms without U.V.R., but that such rooms used for premature infants, and kept closed, had their bacterial content reduced by upcast U.V.R. to about a quarter or a third.

A. Hollaender,⁵ in a survey of work done on ultra-violet radiation as an air disinfectant,⁶ mentions that bacteria and fungi show their highest sensitivity to waves around 2600 Å., and that purified viruses appear to react in the same way. Low-pressure mercury vapour lamps are now in common use which emit 80 per cent of their radiation at wave-length 2537 Å. Possibly a dry atmosphere enhances the ultra-violet sensitivity of certain bacteria. The radiation necessary to produce adequate disinfection has not yet been defined. Reports have appeared of adverse effects on hospital and other workers exposed to 2537 Å. lamps. Research is also required into the possible toxic effect of an excess of ozone produced by these lamps. It is important that publications on this method of air-disinfection should state the intensity and quantity of U.V.R. to which occupants of rooms are exposed. The Council of Physical Therapy of the American Medical Association recommends 5 ergs/cm²/sec. for 8 hours' exposure and 1 erg/cm²/sec. for 24 hours' exposure. It is essential to become conscious of the dangers of U.V.R. if it is used carelessly.

REFERENCES.—¹J. Amer. med. Ass. 1943, **121**, 802; ²J. Hyg., Camb. 1943, **43**, 196; ³Ibid. 11; ⁴J. Amer. med. Ass. 1943, **121**, 908; ⁵Amer. J. publ. Hlth. 1943, **33**, 980; ⁶Med. Annu. 1940, 22, and 1943, 114.

DYSENTERY, BACILLARY.

Sir Philip Manson-Bahr, C.M.G., D.S.O., M.D., F.R.C.P.

TREATMENT.—

Sulphaguanidine.—E. Bulmer and W. M. Priest¹ have issued a masterly summary of the sulphaguanidine treatment of bacillary dysentery. During 1941, out of 2066 soldiers treated for diarrhoea in the Middle East, more than one-quarter (554) were suffering from bacillary dysentery; 76 patients were treated with sulphaguanidine, and there were 2 deaths. The use of this drug was restricted to carefully selected patients, who constituted 13 per cent of the total. Nothing was given but water for the first twelve hours. Saline aperients were not given on the grounds that they merely purge an already dehydrated subject. In the most acute cases blood and plasma transfusions were given with marked benefit. There were remarkably few grave cases and complications were almost absent. Bacillary dysentery, as they encountered it, was mild or moderately severe, but there was a tendency to chronicity. There was only one case of arthritis and one of benign hæmorrhagic nephritis, unaccompanied by œdema or nitrogen retention. Standard doses of sulphaguanidine were adopted and the drug was found to be non-toxic. An initial dose of 6 g. was given, thereafter doses of 3 g. four-hourly, until faecal porridge stools were passed and clinical improvement had been maintained for two to three days; after which the dose was 3 g. thrice daily for a further three days. Total quantities varied from 18 to as much as 350 g. The average effective dose was not less than 50 g., but usually between 100 and 200 g. The general conclusion is that sulphaguanidine is as specific for dysentery bacilli as sulphapyridine for the pneumococcus.

Succinyl Sulphathiazole.—E. Poth and his colleagues² have published a further account of this new drug. Previously two of the authors demonstrated that this drug possesses greater local activity against *Bact. coli* in the bowel than sulphathiazole and sulphaguanidine. It is claimed that the character of the faeces is profoundly altered by the action of succinyl sulphathiazole so that they become practically odourless. The toxicity of this drug is unusually low; approximately 5 per cent of the drug is excreted by the kidneys. General symptomatic treatment consisted of adequate parenteral fluids. The drug is given in very large doses—0.2 g. to 1.0 g. per kilo daily—and is divided into six equal doses, and the length of treatment varied from 2 to 17 days. There were no failures in a series of patients varying in age from 8 weeks to 83 years. The response of 10 children and infants was prompt and appeared to be equally good with smaller as well as with larger doses. The temperature returned to normal within 24 hours in all save one. The results in 10 adults were equally good. The number of patients in the series was insufficient to accurately determine the minimum dosage and the shortest period of therapy.

Shiga's bacillus is especially susceptible to succinyl sulphathiazole and disappears from the faeces within twenty-four hours. The response to succinyl sulphathiazole is immediate, even when the disease has been present for as long as three months.

REFERENCES.—¹J. R. Army med. Cps. 1942, 79, 277; ²J. Lab. clin. Med. 1942, 28, 162.

DYSPEPSIA AND PEPTIC ULCER IN GERMANY DURING THE WAR.

Sir Henry Tidy, M.D., F.R.C.P.

The question of an increase of gastric disorders during the War has caused interest in Germany as in this country but the number of communications in journals accessible in this country is scanty.

The articles abstracted below are lengthy but are mainly discourses on pathogenesis, and they contain little of interest beyond the points here recorded.

The points mentioned resemble those which have been discussed in Britain and the opinions in general are not dissimilar. Fighting troops are less liable to gastric troubles than non-fighting troops.

Ulcers in the Services are usually recurrences of civilian onset. No increase was noticed in the last war either in the Services or among civilians. A great increase has taken place between the wars. There is difference of opinion on the relative incidence of gastric and duodenal ulcers. A curious statement comes from Linz as to the incidence of gastro-duodenitis.

W. Brühl¹ is of opinion that gastric disorders have increased during the war and that this especially applies to gastric ulcer. The incidence of gastric and duodenal ulcer is now equal whereas previously duodenal ulcers were in excess. Gastric acidity has fallen and high acid and climbing curves are rare. The increased incidence in gastric disorders is due to physical and mental strain.

A. Géronne² sent questionnaires to directors of university clinics, chief physicians of large municipal hospitals, and medical officers of large works. Of 47 replies opinions were about equal for and against an increase during the war. There were indications of increase during the war in large cities. A full reply from Gänsslen (Frankfurt) records no increase in gastric ulcer, considerable increase in duodenal ulcer, and a large increase in deformities of the cap. The increase was mainly over the age of 40 years. The relative incidence of gastric to duodenal ulcer has altered from 1:1 to 1:1.5. Statistics from Linz agree with the last figure. The Linz statistics are stated to show that no increase in gastric ulcer occurred between 1930–41, while duodenal ulcer rose: that gastroduodenitis increased during 1930–35, when a remarkable fall set in which has continued during the war. No figures are given.

It was the general opinion that any increase was due to recurrence of old ulcers, with a special tendency to hamorrhage. With regard to the Services, an increase was noted in units which were not fighting, the incidence falling among fighting troops "as in the last war."

The remainder of a lengthy article consists of remarks on pathogenesis and treatment of no special interest or value.

R. Tidow and O. Nekarda³ have investigated 748 Service patients, mainly naval, reporting for gastric disturbances to the out-patient department of the Kiel Naval Hospital. Of these 528 are regarded as gastroduodenal and are classified as follows :—

Carcinoma of the stomach	4
Diverticulum	
Gastric ulcer	66
Duodenal ulcer	143
Peptic ulcer	13
Post-operative states	26
Acute gastritis	6
Chronic gastritis	205
Nervous dyspepsia	13
Secretory abnormalities	48
	<hr/> 528

They remark that duodenal ulcer tends to commence earlier than gastric ulcer. There was no increase in peptic ulcer during the last war, but subsequently the incidence has increased and the peak has not yet been reached. They note that authorities differ as to whether the increase has been in gastric or duodenal ulcer. They consider that irregular meals are the most important factor.

REFERENCES.—¹*Klin. Wschr.* 1942, Oct. 24, 951; ²*Disch. med. Wschr.* 1943, Feb. 12, 121; ³*Ibid.* Feb. 26, 171.

DYSPEPSIA IN THE SERVICES.

Sir Henry Tidy, M.D., F.R.C.P.

A. F. Rook¹ (Air-Commodore and Consultant in Medicine in the R.A.F.) has studied the prognosis of peptic ulcer in Royal Air Force patients, especially in relation to those subjects retained in the Service. The methods of disposal of cases of peptic ulceration in the R.A.F. were decided upon before the onset of the war. Candidates with a history suggestive of peptic ulceration or of recurring indigestion were rejected for flying duties because the stress of flying has been found so often to lead to recurrence of symptoms. For those already in the Service who develop symptoms the object has been to retain as far as possible those of higher rank, trained airmen, and skilled technicians. Before the war diseases of the digestive system accounted for 3 per cent of those discharged for all diseases, but since the war this figure has risen to 17 per cent. Before the war pilots with peptic ulceration were kept on ground duty for about one year. They were then allowed to fly with strict limitation as to the altitude and duration of flight. After a further six to twelve months full flying category was usually allowed in the absence of symptoms. Late in 1942 a study was made of 194 officers and airmen who had been retained in the Service from a total of 1300 cases diagnosed as peptic ulceration. The position in regard to these is shown in the Table on p. 101.

After approximately two years all the officers were still serving, though only 5 of 41 were retained in their full category. Nearly half had been made permanently unfit for service overseas. In the case of airmen at the end of the period nearly three-fifths were still serving and about two-fifths had been invalided. Of the 194 cases 26 were members of air-crews: of these, 8 were permanently unfit for flying, 9 fit for full flying, and 9 allowed limited flying. It is considered that the policy of giving to selected personnel adequate treatment and a good chance to resume duty has been fully justified. It was noticeable that comparison of symptoms in those still serving and those finally invalided gave

no criteria of help in deciding which cases should be retained. Only those who wish to stay in the Service will make a real attempt to regulate their life so that they can carry on. It is never worth while attempting to retain a patient who has had definite peptic ulceration and who wants to return to civil life. An attempt to form special units for men suffering from chronic indigestion was tried and abandoned.

TABLE TO SHOW POSITION IN THE AUTUMN OF 1942, ABOUT 2 YEARS AFTER ORIGINAL DECISION TO RETAIN THE OFFICER OR AIRMAN IN THE SERVICE.

	No.	Full medical category		Home service				Invalided	
				Temp.		Perm.			
		No.	%	No.	%	No.	%	No.	%
Officers ..	41	5	12	17	41	19	47	0	—
Airmen		Still serving		Discharged on grounds other than ill-health				Invalided	
		No.	%	No.	%	No.	%	No.	%
Warrant officers and N.C.O.s	50	42	84	0	—	8	16		
Leading aircraftsmen ..	27	16	60	2	7	9	33		
Aircraftsmen ..	76	32	42	3	4	41	54		
Total airmen ..	153	90	59	5	3	58	38		
Officers and airmen : Total ..	194	131	67	5	3	58	30		

H. J. Wade² (Royal Naval Volunteer Reserve) has reviewed 1003 cases of dyspepsia seen at a Naval Auxiliary Hospital between October, 1939, and September, 1941. Of this total, 221 fell in the group of dyspepsia of uncertain origin, so-called gastritis, and of these symptoms commenced before joining the Service in 102. Symptoms of dyspepsia associated with psychological abnormalities without clinical or other evidence of organic disease accounted for 76 cases. The remaining 70 per cent were probably nearly all peptic ulcers. Of cases of true duodenal ulcer, less than 20 per cent had developed after joining the Service. In March, 1941, the recommendation was accepted that cases of proved active ulceration and those with recurrence of symptoms were to be invalided from the Service. Exceptions were made in the case of key men such as officers and specialist ratings. Of the total of 1003 cases 329 were invalided from the Service, but the rate of invaliding was much lower before the adoption of the recommendation for invaliding. There is no evidence that wartime service in the Royal Navy has increased the incidence of dyspepsia. There is a general similarity between the findings and those of other Service hospitals. [During the first eighteen months of the war the Royal Navy attempted to retain in the Service a higher proportion of cases of peptic ulceration than did the Army or Royal Air Force. Many patients were discharged to duty after a long course of treatment and with advice as to subsequent dietary control. It became evident that in the vast majority of cases the expectations of relief of symptoms were not being realized. This attempt in the early stages to retain patients accounts for the low proportion of discharged in this series compared with the other Services.—H. L. T.]

H. L. Tidy³ (London; late Consulting Physician to the British Army) reviews the question of peptic ulcer and dyspepsia in the Army. The types of dyspepsia occurring in the Services are classified as: (1) Peptic ulcer; (2)

Gastritis and functional dyspepsia ; (3) Transient dyspepsia ; (4) Miscellaneous groups, the number in this being small. Transient dyspepsia tends to develop in new recruits before they are accustomed to army routine, and is probably less common now than in the earlier stages of the war. These men can be successfully dealt with in the Unit. The term gastritis and functional dyspepsia covers the difficult group in which no organic cases are found. These men can in many cases make useful soldiers provided they are not detained too long in hospital. Cure of symptoms should not be attempted. Excess of medical attention and investigation results in exaggeration of symptoms and repeated admission to hospital. The Unit is the proper authority to decide by observation if the man can be usefully retained in his Unit or in his previous category. Of this group the history dates from civilian life in 80 per cent, with an average duration of symptoms of seven years. From admissions to hospital for peptic ulcer in 1942, the onset occurred in civilian life in 81 per cent, namely, 73 per cent for gastric ulcer and 82 per cent for duodenal ulcer. Symptoms due to pre-existing peptic ulcer tend to return in the Army owing to unavoidable routine, and will do so under the best conditions of diet and cooking. There is no evidence of undue development of fresh cases of peptic ulcer or non-organic dyspepsia in the Army. In a series of 2851 cases discharged from hospital 58 per cent were peptic ulcers and 42 per cent non-ulcer dyspepsia. On the question of the relative incidence of gastric and duodenal ulcer, discharges from the Army for a considerable period in 1941 gave 1088 cases of gastric ulcer and 4000 cases of duodenal ulcer, the ratio being 1 to 3.6. This is probably the most reliable estimate, though other statistics based on large figures vary from 1 to 2.1 to 1 to 4.6. The proportion of duodenal ulcer is higher in the age-group 20-30 than in 30-40 years, and higher with a previous duration over 3 than under 3 years. Complications are rare in the Army in peptic ulcer compared with the incidence among admissions of the same age- and sex-group in civilian hospitals, but the rarity is more apparent than real. Slight recurrences of peptic ulcer are admitted to hospital in the Services which would be treated at home in civilian life, and this reduces the apparent incidence of perforations and other complications. Dyspepsia both organic and non-organic has been rare among the A.T.S. female personnel of the Army. The comparative incidence of dyspepsia among males and females of the Army gives a ratio of 4 males to 1 female, and this is closely similar to the ratio of males to females under 40 years in admissions to St. Thomas's Hospital for the years 1933-36, which was 5 to 1. The Army discharges all subjects of peptic ulcer except selected cases of officers and key men.

REFERENCES.—¹*Lancet*, 1943, 1, 733 ; ²*Ibid.* 1942, 2, 637 ; ³*Brit. med. J.* 1943, 2, 73.

DYSTROPHIA MYOTONICA.

Macdonald Critchley, M.D., F.R.C.P.

Few diseases possess more features of clinical interest than dystrophia myotonica—even within the lush terrain of neurology, where clinical bizzarities are so manifold. Within the past decade, a series of papers by O. Maas^{1, 2, 3} has focused attention on this disorder, which had already become "news" through the teaching of W. J. Adie. A fairly recent and succinct review of the disease was made by Maas in 1940.⁴ The same year J. J. Waring, A. Ravin, and C. E. Walker⁵ also published a survey of the subject, comprising 13 cases of their own, but adding little or nothing which is novel.

The psychiatric features of this disease are not without interest. An initial subnormal intelligence is common, and this may be associated with a mild dementia after the onset of neurological symptoms. Temperamental changes, amounting to a mild psychopathy, have often been described, and O. Maas and

A. S. Paterson⁶ have mentioned a "persistent and almost morbid cheerfulness, mild grandiosity, and a lack of drive and initiative".

Maas⁷ has also called attention to the occurrence of dystrophia myotonica in children, usually in the siblings of patients with well-marked features of the disease. Even cataract may be present at a very early age. The course of the disease is not necessarily unfavourable when symptoms and signs develop early. Maas considers that the diagnosis of dystrophia myotonica should always be borne in mind when investigating a case of mental backwardness in childhood.

A later paper by O. Maas and A. S. Paterson⁸ goes more fully into the genetic and familial aspects of the disease. The authors claim that dystrophia myotonica is the same disease as myotonia congenita (Thomsen's disease) and also as paramyotonia. They examined the families of 94 patients, finding 261 individuals with unmistakable signs of the disease, as well as another 286 members who betrayed suspicious features. Eight cases are mentioned where signs of the disease were present in childhood, the youngest affected being 3 years of age. Fleischer⁹ stated that victims usually died about the age of 50, but Maas and Paterson saw patients over 60 and even 70 in comparatively good health. Where the symptoms were slight, the members of the family were often remarkably prolific. In later generations, with the development of more marked features—and especially hypogonadism—the number of offspring fell. Both the miscarriage and the infantile mortality-rates were high. There was an impression that twinning occurred with increasing frequency: out of 728 confinements 14, or 1.92 per cent, were twin births. (The percentage for normal whites in the United States is 1.15—H. H. Newman¹⁰.)

The disease apparently is not incompatible with high intellectual status, except when the manifestations are severe. Reference is made to the celebrated family recorded by J. E. Caughey,¹¹ where the paternal generation included a number of professional men; the grandfather was a University professor; the great-grandmother was a Greek princess, her brother being a celebrated statesman (who possessed a number of traits suggestive of an incomplete form of the disease). Such a family illustrates strikingly the steady decline in intelligence and social position said to occur in this disease with successive generations.

Severer cases were more often observed in males than in females, though exceptions occurred.

A. Ravin and J. J. Waring's view¹² that dystrophia myotonica in its complete form affects one generation only, was not confirmed by Maas and Paterson. Transmission through a completely unaffected person probably does not take place, though the manifestations of the disease may be very slight in a carrier. The disease is inherited from males and females alike.

Special attention was paid to the question whether one or more factors are involved in the transmission. On the grounds that *formes frustes* or slight cases exist in this disease, it would appear impossible to believe that the disease is transmitted by simple dominance. They believe that the disease is transmitted by several factors, one being responsible for myotonia, one for cataract, one for wasting, and so on.

In many families the disease comes on at an earlier age and more intensively in successive generations (anticipation, potentiation). Mental defect usually appears in the second generation, or later. In certain families the opposite phenomenon (regeneration) seemed to take place; such were rare, however.

REFERENCES.—¹*Z. ges. Neurol. Psychiat.* 1933, **66**, 377; ²*Brain*, 1937, **60**, 498; ³*Ibid.* 1938, **61**, 449; ⁴*Med. Pr.* 1940, **203**, 202; ⁵*Arch. intern. Med.* 1940, **65**, 763; ⁶*Lancet*, 1937, **1**, 21; ⁷*Brit. J. Child. Dis.* 1941, **38**, 59; ⁸*Brain*, 1943, **66**, 55; ⁹*Arch. Ophthalm.* 1918, **96**, 91; ¹⁰*Twins and Super-Twins*, 1942, London; ¹¹*Trans. ophthalm. Soc. U.K.* 1933, **53**, 60; ¹²*Amer. J. med. Sci.* 1939, **197**, 59.

ELECTROCARDIOGRAPHY.*William Evans, M.D., F.R.C.P.*

Nomenclature.—Electrocardiographic nomenclature, like any other language, is continuously changing. With the advance of knowledge the terms and symbols introduced by our predecessors have been utilized to meet new needs and have acquired meanings which they did not possess and which are not regarded as the same by all workers. In order to avoid misunderstanding, a Committee of the American Heart Association¹ have proposed a re-definition of those terms which are in general use. The symbols P, T_a, QRS, T, and U should continue to express the deflections to which they were originally assigned both in the normal and abnormal cardiogram. Each has a distinctive origin. The P is held to represent the electrical force produced by depolarization (activation) of the auricular muscle; the T_a the electrical force produced by repolarization of the auricular muscle. The QRS and T are held to represent the electrical force generated when the same processes take place in the ventricular muscle. The U is less well understood, but probably represents some sort of readjustment of the polarization of the ventricle. In the majority of cases the QRS complex is superimposed on the T_a deflection. The individual components of the QRS complex are not entities of the same sort. They vary in number from subject to subject and from lead to lead. They have not been related to different events of the cardiac cycle. The Committee recommended that a downward deflection should never be labelled R on the ground that it occupies the same interval and represents the same resultant forces as an upward deflection in another lead to which this letter has been appropriately assigned. It is equally disadvantageous to label an upward deflection as Q or S because it corresponds in time to a downward deflection in another lead to which the same letter has been allotted previously. The multiplicity of leads now in use justify the labelling of the QRS components of one lead without reference to the number or character of the QRS components in any other lead. The allocation of the symbols employed should be determined solely by the direction and sequence of these deflections in the lead under consideration. The earliest QRS deflection which lies above the reference level should be labelled R. Any downward deflection which precedes R, so defined, should be labelled Q. The first of any downward deflections which may follow R should be labelled S. The first of any upward deflections which may follow S should be labelled R¹ and the first of any downward deflections which may follow R¹ should be labelled S¹. The term "diphasic T wave" should be applied to those final ventricular deflections which present two distinct turning points, one on each side of the level of reference. If the earlier turning point lies below this level and the latter above it, the diphasic T wave may be said to be of the minus-plus ($\bar{+}$) type. If the reverse is the case, it may be said to be of the plus-minus (\pm) type. The term "concordant" applied to the QRS complex or to the T deflection should signify that the largest deflection is in the same direction in Lead III as in Lead I, while the term "discordant" should signify that the largest deflection or displacement in Lead III is opposite in direction to that in Lead I.

Cardiac Infarction.—The difficulty of diagnosing the cardiogram of hypertension and aortic valvular disease from that in such patients in whom anterior cardiac infarction has been added, is known. E. P. Sharpey-Schafer² gave to these patients 20 g. of an equal mixture of potassium chloride and potassium citrate and noted the cardiographic changes which took place. T wave inversion due to cardiac infarction was further inverted by raising the serum potassium value, while T wave inversion due to preponderance of a ventricle became upright. He said that the method was useful in the analysis of difficult electrocardiograms. [A warning must be issued on the administration of such a heavy dose of potassium salts where electrocardiograms connote a badly injured myocardium.—W.E.]

A new chest lead, CR₇, was tested by W. Evans and A. Hunter³ in the same differential diagnosis. When the limb lead electrocardiogram showed changes suggesting cardiac infarction in patients known to have hypertension or aortic valvular disease, they found help from this newer chest lead. Thus, when the T in IVR shows greater inversion than the T in CR₇, the change is usually due to supervening cardiac infarction, but if the inversion is greater in CR₇ than in IVR, the change is likely to be the result of hypertension or aortic valvular disease alone. CR₇ had greatest value in distinguishing between T₂ and T₃ inversion of posterior cardiac infarction and similar changes found in heart failure from emphysema, in pericardial disease, in congenital heart disease, and occasionally in healthy subjects.

Deformity of S-T Segment.—The significance of a saddle-formed S-T segment has been investigated by K. Larsen and P. Magnusson⁴. Past writers have inclined to regard it as indicating coronary disease. The deformity is designated saddle-formed when the S-T segment, after leaving the QRS complex, describes a downward convex curve passing into the positive T wave without reaching 1 mm. or more below the iso-electric level. Saddle-formed S-T segments occur most often after QRS complexes in which the S wave is absent. Larsen and Magnusson found this cardiographic variation with equal frequency in normal subjects and in patients with heart disease, and they concluded that it had no diagnostic significance.

REFERENCES.—¹*J. Amer. med. Ass.* 1943, **121**, 1347; ²*Brit. Heart J.* 1943, **5**, 80; ³*Ibid.* 73; ⁴*Acta med. scand.* 1942, **111**, 488.

EMBOLISM. (See BLOOD-VESSELS, SURGERY OF.)

EMPHYEMA, CHRONIC.

A. Tudor Edwards, M.Ch., F.R.C.S.

Chronic empyema, generally the result of neglect in diagnosis and treatment of the acute empyema, still provides a problem for the thoracic surgeon. Only too often has the patient been previously submitted to multiple rib resections with nothing definitely envisaged except a hope that the empyema will heal. All chronic empyemas require individual treatment, although many will heal satisfactorily by the provision of adequate drainage.

P. R. Allison¹ puts forward an operation which he has found of value in certain selected cases. He cites particularly those situated high under the scapula, and those associated with bronchial fistula. Such cavities often represent the final equilibrium after adequate and continued drainage has produced its maximal result. The capacity of the cavity may be small, but may require removal of a large area of chest wall including portions of 7 or 8 ribs.

The method advocated in this paper consists of resecting lengths of one or two ribs at the base of the empyema in order to gain access to the empyema cavity and then stripping the thick parietal layer of fibrous tissue from the overlying intact ribs and intercostal structures, depressing it on to the surface of the thickened visceral pleura, and holding it there by means of a pack. This obliterates one cavity and makes a second of equal volume, but the walls of the new cavity are fresh and heal up rapidly.

After full and adequate treatment by drainage and irrigation a period is reached when no further diminution in the cavity may occur for several weeks. This is the time the operation is advocated, and the lower ribs over the cavity are resected to allow approach to the cavity. Immediately deep to the lowest intact rib is seen the glistening white face of the cut parietal fibrous layer. A line of cleavage between this layer and the rib is formed by nosing a pair of closed scissors and then opening them parallel to the rib. This area is enlarged sufficiently to get the index finger into the layer stripping, which may be

assisted with instruments. The flap is freely mobilized until it can be pressed down on the visceral layer. When the cavity is narrow and the fibrous layer thick, close approximation is impossible. In such cases the flap may be incised on the bevel to permit approximation. Packing is done with sulphanilamide gauze, and must be firm enough to produce uniform approximation of the two layers. The chest-wall wound is lightly packed and a firm elastoplast dressing applied.

Ten days later the pack is removed under anaesthesia and the parietal flap found to be firmly fixed down, sealing off bronchial fistulae when present. The remaining cavity is washed out once or twice daily and a light gauze pack wrung out in Dakin's solution lightly inserted. In the later stages tube drainage may be necessary.

Three illustrative cases are recorded by the author. The method would appear to have definite indications especially in the presence of bronchial fistula.

Local Effect of Sulphonamides in Pleural Infection.—Sulphonamides, as in every other type of infection, have been used to control sepsis in the pleural cavity. E. M. Kent and E. H. Graham² recorded experiments on the prevention of empyema in dogs; 2 c.c. of purulent material obtained from patients with empyema were placed in the pleural cavity through an intercostal incision in six groups of experiments. In the first group of four dogs, no sulphonamide was given and all died of empyema. In the next four groups, 4 g. of sulphanilamide, sulphapyridine, sulphathiazole, and sulphaguanidine respectively were placed in the pleural cavity at the same time as the pus. In the sixth group a mixture of 1 g. of each of the drugs was used. No evidence of infection was found in the twenty animals at autopsy three weeks later.

R. A. Daniel, F. T. Billings, and R. R. Crutcher³ carried out further experiments to determine the relative effectiveness of the common sulphonamides, against the hæmolytic *Staphylococcus aureus* introduced after experimental pneumonectomy in dogs. They arrived at the following conclusions: (1) There is little gross local evidence of reaction to sulphanilamide or sulphathiazole used in the pleural cavity following pneumonectomy; sulphadiazine produces a more marked inflammatory reaction than do the other drugs. (2) The local use of sulphathiazole is more effective in preventing hæmolytic staphylococcus empyema following pneumonectomy in the dog than is either sulphanilamide or sulphadiazine; the effect of sulphanilamide is least effective in the prevention of this infection. (3) The absorption of sulphanilamide from the contaminated pleura takes place slightly more rapidly than sulphathiazole; sulphadiazine is absorbed more slowly than either of the other drugs. (4) A greater incidence of wound disruption in animals in which sulphathiazole was used suggests that this drug may have interfered with the healing of wounds.

REFERENCES.—¹*Lancet*, 1943, 1, 232; ²*J. thorac. Surg.* 1941, 11, 203; ³*Ann. Surg.* 1943, 117, 670.

ENDOCARDITIS, BACTERIAL.

William Evans, M.D., F.R.C.P.

Pneumococcal Endocarditis.—Examination of 20 cases of pneumococcal endocarditis allowed R. W. Luxton and G. S. Smith¹ to draw the following conclusions: It is usually, although not invariably, associated with pneumonia, and the signs of a generalized pneumococcal infection, especially meningitis, are common. Empyema is also common. Pneumococcal endocarditis may occur at any age, but is most common in middle life. The left side of the heart is more prone to the infection than the right, and the aortic valve is specially vulnerable. The vegetations are characteristically large, single, yellowish-green in colour, and with a smooth surface. Owing to the brevity of the illness

the spleen may not be palpable and clubbing of fingers is often absent. Pericarditis developing during or after pneumonia should lead to the suspicion that the endocardium is affected. Treatment of the developed disease with sulphapyridine and serum produces symptomatic improvement, but is without effect on the ultimate result, and prevention should be the chief aim of treatment.

Streptococcal Endocarditis.—It is common experience to witness some improvement in fever in bacterial endocarditis following the use of sulphanilamide, sulphathiazole, and sulphadiazine, together with some decrease in the number of colonies in agar plate blood-cultures, but it is rare to obtain a negative blood-culture over an extended period. G. F. Dick² has reported a case where recovery took place after the intravenous injection of 40 g. of sodium sulphadiazine in 500 c.c. of water; somewhat alarming, but transient, renal damage was caused.

W. R. Galbreath and E. Hull³ reported no lasting benefit in 49 patients with *Str. viridans* endocarditis treated with sulphonamide preparations, and all of them died.

REFERENCES.—¹*Quart. J. Med.* 1943, 12, 61; ²*J. Amer. Med. Ass.* 1942, 120, 24; ³*Ibid.* 1943, 122, 255.

ENTERIC FEVER (Typhoid and Paratyphoid Fevers).

II. Stanley Banks, M.A., M.D., M.R.C.P., D.P.H.

Epidemiology.—The number of notified cases of enteric fever in 1942 was 858, the lowest ever recorded. This figure is to be compared with 4763 cases in 1941 and 2833 cases in 1940. The deaths in these three years were respectively 89, 148, and 135.¹ The discovery of Craigie and Yen² that typhoid bacilli can be divided into a number of well-defined types by means of type-specific Vi bacteriophages has been applied by A. Felix³ to the typing of 363 (84.1 per cent) of 432 strains investigated. Most of the strains belonged to 8 of Craigie's original 18 phage types. In addition 4 new Vi-phage types were identified.

Prophylaxis.—Col. J. S. K. Boyd⁴ was able to compare the respective merits of the British Army T.A.B. vaccine and Italian vaccine in the Middle East. The Axis prisoners of war were found to have a high endemic level of enteric fever, and despite inoculation with their own vaccine a considerable epidemic occurred among them in the summer of 1941. Subsequently when these prisoners were inoculated with British Army T.A.B. the outbreak ceased and the endemic level remained low throughout 1942. On the other hand, the Allied prisoners in Italian hands at Benghazi living under conditions of poor sanitation escaped unscathed, although typhoid was rife among their captors. The superiority of British vaccine over two types of Italian T.A.B. was confirmed by mouse protection tests.

Treatment.—The ineffectiveness of sulphaguanidine in the treatment of paratyphoid B infection was stressed by T. F. McNair Scott et al.⁵ not only in the acute and convalescent stages, but also for persistent excretors. In the acute stage 20 males and 20 females on one side of the wards were given a 10-day course of sulphaguanidine and 23 males and 25 females on the other side of the same wards were used as controls. No effect was noticed on the course of the disease and there was no significant difference in the time of clearing of stool cultures in the two groups. In a controlled group of early convalescents given 8 g. daily for 10 days it could be concluded that sulphaguanidine did not shorten the period of excretion of the organism. In 4 patients who had been excreting the organisms for 3–4 months after the onset of their illness, no clearing was obtained by sulphaguanidine or by sulphadiazine, tetraiodophenolphthalein, or mepacrine hydrochloride either singly or in combination. In some of the above cases there was a drop of temperature that looked like a critical response to the drug, but equally critical falls of temperature occurred on the same day of the

disease in the controls. In a variable disease like paratyphoid fever, thoroughly controlled observations are necessary to avoid erroneous impressions.

REFERENCES.—¹*Summary Rep. Min. Hlth.* 1943, 47, 48; ²*Canad. publ. Hlth. J.* 1938, 29, 448, 484; ³*Brit. med. J.* 1943, 1, 435; ⁴*Ibid.* 719; ⁵*Lancet*, 1943, 1, 487.

ENTERIC FEVER EPIDEMICS.

Ralph M. F. Picken, M.B., Ch.B., B.Sc., D.P.H.

Vi Bacteriophage Typing in Epidemiological Investigation.—A most interesting illustration of the value of Vi phage typing as a means of tracing the source of typhoid infection is given by W. H. Bradley.¹ *E. typhi*, Type D4, was first identified in the blood of an apparently sporadic case in Buckinghamshire in January, 1941. It was decided to make close epidemiological inquiries into every case in which this rare type was identified by the Emergency Public Health Laboratory Service. During 1941 and 1942, 24 such cases occurred throughout the whole country, 23 of which are included in this series, most of them in Buckinghamshire. All of them had a direct or, as secondary cases, an indirect association with a source of milk supply, one large milk depot in Hertfordshire, or with a farm from which it derived a small proportion of its milk. Only one small group of cases occurred in one place at one time; the rest were spread over 4 counties and 10 administrative areas throughout 2 years. The origin was cleared up, so far as it ever will be, by a worker at the farm mentioned (in Wiltshire, 100 miles away from most of the cases) contracting infection with Type D4, which led to the discovery that the farmer himself was a carrier also of this type. In retrospect it could not be proved that all the primary cases had consumed milk from this farm in the raw state, but at the relevant times it was possible that they had. Apparently some of this milk was sometimes pasteurized. The points of this investigation are that, in spite of the usual difficulties in tracing the ramifications of milk infection by field inquiry, the common incidence of this rare type of *E. typhi* made it reasonably certain that the cases had a common source which could be traced, and demonstrated that milk-borne typhoid may manifest itself in sporadic cases over a long period, without any large explosive outbreak.

S. M. Allan² reports an outbreak in a mental hospital in December, 1941, which also illustrates the use of typing. A nurses' home in which some mental patients also worked was affected. In all 27 cases (26 nurses and 1 maid) went sick with typhoid, most of them within a period of three weeks. *E. typhi* was identified by Dr. Felix, at the Lister Institute, as belonging to Type C in all cases. After thorough search affecting everybody connected with the home, a patient who helped in the nurses' dining-room and in association with the affected maid was found to be a carrier of *E. typhi*, Type C. Only 4 other carriers were known in the hospital, 3 of them Type F1 and 1 Type A, so that the source was narrowed down to the patient mentioned.

Effect of Immunization.—It is also interesting to note that inoculation of 14 of the 27 patients between 1938 and 1941 in the above outbreak failed to protect them, although the proportion of mild cases was a little higher in this group. During the epidemic all the personnel were inoculated with heat-killed T.A.B. It is not claimed that its course was affected by this measure. As the result of the experience of heat-killed T.A.B., alcohol-killed alcohol-preserved T.A.B.C. is now being used. E. C. Dax and D. M. Stone³ also report the results of immunization during a summer outbreak of paratyphoid B in a mental institution. It was also explosive, 19 cases occurring within three weeks in one villa. The source of infection was not traced, but examination of urine and faeces of all inmates after the last case had occurred brought to light 23 sub-clinical cases or carriers. By this time all inmates had begun a course of T.A.B.

heat-killed vaccine, and it is possible, though by no means certain, that it may have the credit for no further clinical cases occurring. There was no evidence that it did any harm, or was responsible for the carrier state. Of 15 clinical cases which survived, 2 excreted the organism for 9-10 weeks, 1 for at least 36 weeks, and 2 for more than 2 years; of the 23 sub-clinical cases, only 2 carried beyond 8 weeks, one of whom persisted and the other relapsed and remained a carrier after 2 years. Their ages are not given.

REFERENCES.—¹*Brit. med. J.* 1943, 1, 438; ²*Lancet*, 1943, 1, 708; ³*Ibid.* 1942, 2, 422.

EPIDEMIC NAUSEA AND VOMITING. *W. N. Pickles, M.D., M.R.C.P.*

The first outbreak of this disease to be recorded in this country was by Drs. Reginald Miller and Martin Raven¹ in June, 1936. The incident occurred in a boarding school for girls in March the same year and resembled epidemics reported in Denmark under the title of "epidemic nausea". The authors point out that the Danish writers use the term nausea in its original meaning of sea-sickness, which is inclusive of vomiting and giddiness as well as the feeling of sickness which is the usual meaning of the word. The symptoms noted in this epidemic were either vomiting of sudden onset or nausea, and a sensation of giddiness present in a quarter of the sufferers. The illness ran a short afebrile course, all the patients except one recovering in 48 hours. The incidence was high. Within 15 days one-half of the pupils and one-third of the adults, 52 out of 117, were attacked. On the first day 14 people, 11 girls and 3 adults were affected, three with nausea alone and eleven with vomiting; on nine of the days of the next fortnight sufferers appeared with the following daily incidence: 10, 7, 7, 4, 6, and single cases on four other days.

Vomiting was present in 42 of the 52 sufferers and was of sudden onset and uncontrollable. Girls were sick wherever they happened to be, whether in school or grounds or before they could get out of bed. Many were sick only once, and in no instance did vomiting continue for more than four to six hours.

Nausea rather curiously appeared as an alternative to vomiting, those who vomited showing little premonitory nausea. In 10 instances there was nausea for several hours and no vomiting.

Giddiness occurred in 13 of the 52 patients, and was worse in those who suffered from nausea without vomiting. This symptom was present in 9 of those who vomited, but also passed off in a few hours.

There was slight coating of the tongue and loss of appetite after the urgent symptoms. In two instances there were moderate initial temperatures (100° to 101°), all others being afebrile throughout. None developed abdominal pain, tenderness, or diarrhoea. On the third day patients resumed school routine and ordinary diet.

The incubation period was as long as 8 days in one instance but usually between 2 and 4.

The authors refer to the Danish epidemics, one in July, 1935, described by A. Rischel, the other in December of the same year by E. J. Henningsen. In the first in the Island of Ankalt the sole difference in the symptoms from those of the English epidemics was the presence of diarrhoea with mucus in the stools. Recovery took place in from a few hours to 2½ days. The incubation period was judged to be between 2 and 7 days. The latter Danish author records an extensive epidemic in the town of Roskilde in which 171 persons were affected out of 423 in 107 households and in which no age was immune. An interesting additional point was the occurrence of relapse in some instances, the symptoms recurring after an interval of two to seven days after apparent complete recovery. He considers the incubation period about 2 days. Food, water supplies, and faecal contamination were considered as factors in epidemic

spread but dismissed as unlikely. Henningsen suspected that the disease primarily affected the nervous system.

In an able discussion Miller and Raven consider the differences between the Danish and English epidemics so slight as to warrant the conclusion that the same disease was present in both, diarrhoea and relapses being the only additional symptoms in the former. The authors rule out conclusively the possibility of food poisoning, being helped by the history of four girls who developed symptoms within one to seven days of leaving school. Considering the possibility that it is primarily a disease of the alimentary system, giddiness, which was so prominent as a symptom in the epidemics of both countries, raises a difficulty as also does the explosive vomiting, the absence of fever, and of diarrhoea in the English cases. They discuss, however, the possibility especially of the Danish epidemics being the gastric form of Sonne dysentery upon which such stress has been laid by R. E. Smith, but quote no bacteriological investigations. Epidemic vertigo as described by O. Leyton² does not appear to have been the same type of disease (but *see below*).

Following the stimulus of this paper three further epidemics were recorded in letters to the *British Medical Journal*.

Dr. C. S. Storrs³ describes an epidemic at Mullion, Cornwall, which he considered rightly to resemble more closely the Danish than the English outbreaks. Relapses or a second attack occurred in about 15 per cent of sufferers. Diarrhoea was present in quite 20 per cent and moderate fever in about 5 per cent. Abdominal pain was also observed. Vomiting always preceded giddiness, the former lasting but a few hours, the latter for many days.

Dr. L. W. Pole,⁴ Medical Officer of Health for Llanelly, records a similar outbreak in which 8 teachers out of 17 and 50 boys out of 187 were affected in a school camp in South Wales in six days. In five patients no vomiting occurred but nausea was present. The principal symptoms before an attack of vomiting were abdominal pain, chilly sensations, headache, giddiness, nausea, diarrhoea (7 patients). In no case was there any rise of temperature. After vomiting, the principal symptoms were abdominal pain, headache, giddiness, and chilly sensations. In all instances there was apparent complete recovery with return of appetite in 48 hours. Examination of the milk gave no useful information, neither did an examination of vomited matter and faeces. Dr. Pole concluded that the evidence was against *Salmonella* infection. As the senior cook had had a transient attack of diarrhoea a day before the outbreak began, he suggests him as a possible culprit (via the milk which did contain a few staphylococci), but states that the examinations produced no satisfactory evidence to support this theory.

Dr. I. Finer,⁵ Assistant Medical Officer of Southlands Hospital, Sussex, saw 6 children out of a group of 12, aged from 3 to 5, complaining of vomiting, the foster-mother having two days later vomited and had diarrhoea. Inspection of the children's stools showed them to be formed and without blood or mucus, but it was reported that one child had relaxed stools. The stools inspected were abnormally light in colour. The general health of the children did not suffer and vomiting ceased after the fourth day. Five of these children were known to have had Sonne dysentery, but the stools from all these patients were examined and found to be negative for this organism. There is no mention of nausea or vertigo and Dr. Finer states that no obvious explanation of the vomiting was found. Although there is no definite indication that this group corresponded with that described by Miller and Raven, he reports it as suggestive.

Drs. Miller and Raven in a letter to the same journal accept Dr. Storrs' opinion that the Mullion epidemic was of this nature but were unable to confirm from

their own experience that vomiting always preceded giddiness. They acknowledge several private communications concerning epidemics which were thought to resemble the one they describe, and one from Dr. Leyton which, they say, would have led them to express a more cautious opinion on the relationship of the two sets of epidemic cases had they received it before their article was published. They suggest that in an epidemic showing as its cardinal symptoms nausea, vomiting, and vertigo, nausea and vomiting might dominate the picture in some instances and vertigo in others.

In February, 1939, Dr. J. D. Gray,⁶ referring to previous epidemics, described an outbreak in South Hampshire, and suggested the probability of the widespread incidence of the disease. He stressed the importance of the recognition of the syndrome so that endless trouble might be saved in lengthy and useless investigations into food supplies, etc., and to rescue another disease from the conglomerate called 'gastric influenza'. The illness is short, he states, lasting about two days. The patients complain of dizziness, nausea, and vomiting, less frequently of dizziness and nausea alone. Frontal headache and bradycardia were noted, and diarrhoea also was a symptom in this epidemic. Some degree of pyrexia did occasionally occur.

The epidemic was divided into two parts. In a school on Hayling Island 49 sufferers were observed out of 82 girls and 20 staff. The first patient fell ill on September 27 and the last on October 25 (1938). Dizziness was present to some extent in all cases. It was most marked in the children who did not vomit, and these compared their sensations to sea-sickness. Bradycardia was present in 6 out of 42, 5 had temperatures lasting about a day, and 12 complained of frontal headache. All except one were fit for school in 3 days. Food, milk, and drains were checked and absolved from suspicion. In the countryside there were 26 sufferers, 19 adults and 7 children, 19 complaining of dizziness, 24 vomiting, and all having nausea. Eleven had diarrhoea, three each had slight fever, frontal headaches, and abdominal tenderness.

The author considers that this epidemic bridges the gap between the Danish and former English epidemics. Thus the disease may or may not be institutional. The common symptoms are nausea, vomiting, and giddiness. Diarrhoea may follow the vomiting. Uncommonly there is fever, and frontal headache may be a distinct feature. No organisms associated with gastro-enteritis have been discovered. The epidemiology suggests a person-to-person spread and not a food or water contamination, and a two-day incubation period is probable. The author agrees with Miller and Raven that the probabilities point to an acute infection of the central nervous system, and all the symptoms with the possible exception of diarrhoea can be explained on this assumption, the infecting agent being most likely a virus. Droplet infection is considered to be the most probable method of spread. The importance of the disease does not lie in its manifestations, but in the resemblance to food poisoning or Sonne dysentery, which are much more serious matters.

Dr. W. H. Bradley,⁷ in a publication of March, 1943, writes that recently the disorder has become much more common. He very rightly states: "Although the disease is of minor significance clinically and economically it may give rise to considerable administrative uncertainty. Those unfamiliar with the clinical and epidemiological picture may be led to suspect food poisoning or dysentery and be stampeded into ineffectual and wasteful action. It is important that at the present time epidemic nausea should be considered in the differential diagnosis of all outbreaks of gastro-enteritis." He goes on to describe an epidemic in an urban district with a population of 10,000, the Medical Officer of Health of which was informed of an outbreak of vomiting and diarrhoea in a girls' public boarding and day school. Suspicion fell on the milk-supply,

apparently unjustly, as other schools consuming milk from the same purveyor remained free and an examination of milk showed no pathological organisms. Shortly afterwards, a boys' public boarding and day school in the town experienced an explosive outbreak and the Ministry of Health was asked to advise as to further action.

No estimate of incidence among the general population could be made, the disease not being notifiable and the sufferers not usually coming under the care of doctors. Reliable information on attack rates was obtained from the girls' school, also incorporating an evacuated school.

TABLE SHOWING ATTACK RATES DURING FIRST WEEK OF OUTBREAK.

		BOARDERS			DAY GIRLS			TOTAL		
		Roll	Incidence	Attack rate per cent	Roll	Incidence	Attack rate per cent	Roll	Incidence	Attack rate per cent
Girls' public school	..	85	58	68	324	123	38	409	181	44
Evacuated school	..	21	8	38	181	27	15	202	35	17

The attack rate for the general population was estimated at 15 per cent. The incidence appeared at first to be highest in communities of young people, but in one household the ages of sufferers was 50, 54, 56, and 81 years, and the attack rate among the adult staff of the girls' school was high.

CLINICAL PICTURE.—

Vomiting was of the uncontrollable type in many though not in all instances. Also a large proportion of sufferers, especially adults, did not vomit at all or only after a prolonged period of nausea.

Nausea was usually present with vomiting, but sometimes preceded it for a period of hours or even days and was sometimes unaccompanied by vomiting. Nausea was said by some patients to be indistinguishable from sea-sickness and was associated with the feeling of fullness in the epigastric angle. In one instance when it had persisted for a week, the epigastrium was tender to touch.

Vertigo often included a sense of instability and dizziness. A tendency to fall over or faint was present in some instances, but in a few only did dizziness amount to true vertigo.

Aches.—Frontal headache was present nearly always in a varying degree and occipital headache did occur. Abdominal aching occurred mainly in the epigastric angle, sometimes in the umbilical region, and in patients with diarrhoea sometimes below the umbilicus. Pain from colic was conspicuously absent.

Diarrhoea was of minor importance; mucus was not present, but blood was passed in one instance.

In one girls' boarding-house the relative frequency of symptoms was as follows :—

Population at risk	35
Vomiting without diarrhoea	11
Vomiting with diarrhoea	7
Diarrhoea only	1
Nausea only	7
Total cases	26

Dr. Bradley suggests that when a group of these sufferers was seen together the impression that the central nervous system was primarily involved was a strong one; signs of gastritis and enteritis were absent, and there was no evidence of dehydration, severe intoxication, or collapse. Some degree of mydriasis with sluggish pupils was observed.

Temperature and Pulse.—In all taken some rises were noted, rises of temperature above 100° being uncommon and in very few as high as 102°. Pyrexia was rarely of more than 24 hours' duration.

Alimentary System.—Tongue was moist, lightly covered with white fur with projecting hyperæmic papillæ, resembling the tongue of streptococcal throat infections. In some instances there was moderate injection of the fauces, but no tonsillar exudate; swabs taken did not yield a growth of streptococci.

Relapses, as recorded by Rischel and Gray, occurred at a week's interval in some sufferers.

EPIDEMIOLOGY.—

Family Outbreaks.—By interrogation a number of these in the town were discovered in retrospect, and the earliest preceded the school epidemics by five weeks. An elementary school teacher involved in one of these continued at duty in her class, no member of which developed symptoms within seven days.

Community Outbreaks.—The incidence in all boarding establishments was much higher than in the billeted children, which seems clear from the table above, and which was also true of the boys' school.

Bacteriology.—Three specimens of milk from the suspected source and 12 specimens of vomit and fæces were examined with negative results.

It was considered that the explosive outbreak reported to the M.O.H. was the summit of a wave of disease not only in the town but in the several communities. This pattern is unlikely to be produced by food poisoning, although this cannot be dismissed on these grounds alone. It was impossible to identify a common meal, and if the toxic factor were food-borne it appeared to withstand cooking. Liquid milk was ruled out as a factor.

The outbreak gives the impression that the disease is communicable and the portal of entry is the upper air-passages. The incubation period was probably from 2 to 7 days. An alimentary vehicle consumed a few days before the appearance of symptoms could not be excluded, but as a cause was thought to be improbable.

REFERENCES. ¹*Brit. med. J.* 1936, 1, 1242; ²*Lancet*, 1933, 2, 1392; ³*Brit. med. J.* 1936, 1, 1321; ⁴*Ibid.* 2, 149; ⁵*Ibid.* 98; ⁶*Ibid.* 1939, 1, 209; ⁷*Ibid.* 1943, 1, 309.

ERYTHEMA NODOSUM IN RELATION TO TUBERCULOSIS. (See TUBERCULOSIS, PULMONARY.)

EVACUATION: EFFECT ON INFECTIOUS DISEASES. (See INFECTIOUS DISEASES: EFFECT OF EVACUATION.)

EYE DISEASES: BACTERIOSTATIC DRUGS IN.

Sir Stewart Duke-Elder, M.D., F.R.C.S.

In recent numbers of the MEDICAL ANNUAL the value of the sulphonamide group of drugs in ophthalmology has been pointed out, particularly in the treatment of gonococcal infections and corneal ulcers. During the past year experience with penicillin, although as yet very small in volume, tends to suggest that it is more effective.

So far as the *sulphonamides* are concerned, the weight of clinical opinion seems to be that for intra-ocular infections oral administration is more valuable than local administration, possibly because the concentration of the drug in the aqueous is higher in the first case. In general terms it may be taken that after oral administration the aqueous level of sulphanilamide and sulphapyridine is about two-thirds of the blood level, that of sulphadiazine one-half, and that of sulphathiazole about one-fifth. After instillation or injection into the conjunctival sac or after subconjunctival injection the concentration is much

less than this. Boyd¹ (1942) and Sallmann² (1943), however, have been able to increase the local concentration of sulphathiazole and sulphadiazine by iontophoresis ; while Bellows and Gutmann³ (1943) have also succeeded experimentally in increasing the corneal permeability very considerably by combining the locally applied drug, particularly sulphathiazole, with a "wetting agent"—that is, a substance such as aerosol, tegitol, or ocnol, which lowers interfacial tension, increases penetration of tissues, and acts as an emulsifying agent. The clinical application of these adjuvants to absorption into the eye will be awaited with interest. In external diseases, suppurative conjunctivitis and corneal ulcers, the best results are probably obtained from a combination of both general and local treatment. The utility of the group can hardly as yet be said to have been demarcated ; but it is clear that they are brilliantly effective in purulent conjunctivitis, particularly in the gonococcal types (*see* MEDICAL ANNUAL, 1943, p. 95), and carry distinct promise in hypopyon corneal ulcers and in some acute intra-ocular infections. It is to be remembered, however, that the experimental findings of Bellows⁴ (1943) indicate that the sulphonamide compounds have an unfavourable effect on rapidly growing epithelium and tend to increase the amount of scarring. They should not therefore be used without due reason in corneal lesions—a consideration which does not apply to penicillin. The staphylococcus has a higher resistance than the streptococcus and gonococcus (Scott,⁵ 1943 ; Johnstone,⁶ 1943 ; Bellows,⁴ 1943 ; Thygeson,⁷ 1943 ; and others), and in trachoma the earlier and somewhat uncritical enthusiasm has now generally been replaced by the more sober admission that these drugs may be of value in eliminating the secondary infections so frequently associated with this disease (MacCallan,⁸ 1943). Finally, evidence from theatres of war abroad which is now accumulating but is not in a form suitable for publication, makes it clear, in comparison with statistics from the last war, that the prophylactic administration of the sulphonamides is of great value in wounds of the eye and its adnexa by lowering the incidence of post-traumatic infection.

Ocular complications from the systemic administration of the sulphonamides have been few and relatively unimportant. A transient myopia has been reported on several occasions (literature in Rittenhouse,⁹ 1940 ; Bristow,¹⁰ 1940 ; Hornbogen,¹¹ 1941 ; Blankenstein,¹² 1941 ; Friedman,¹³ 1941 ; Sorsby,¹⁴ 1943) ; retinal hæmorrhages (Goar,¹⁵ 1942) ; optic neuritis (Duggan,¹⁶ 1941 ; Bloom,¹⁷ 1941) ; and conjunctival reactions. The latter have usually been slight and of the nature of a mild hyperæmia frequently associated with a general skin reaction ; but one case, seen by the reviewer, gave rise to a considerable amount of anxiety (Schnee,¹⁸ 1943). Following the administration of 18 g. of sulphathiazole a severe membranous conjunctivitis developed associated with a similar non-organismal inflammation involving the upper respiratory passages—nose, pharynx, mouth, and larynx. It subsided on discontinuance of the drug, relapsed on its renewal, and cleared up on its stoppage.

The position with regard to *penicillin* is not so advanced, and although some ophthalmic cases have been treated, notably by Florey¹⁹ (1941) and in the Services with good results, sufficient material has not yet accumulated to present authoritative conclusions. Since there is reason to believe that the drug will not pass from the blood-stream into the chambers of the eye, such treatment has been limited to local application. Two papers dealing with experimental work on rabbits are, however, available, one by Robson and Scott²⁰ (1943) of Edinburgh, working on staphylococcal hypopyon ulcers, and the other by Sallmann² (1943) of New York working on experimental intra-ocular infections with pneumococci injected into the eye. Both obtained excellent results superior to those in controlled experiments with sulphonamides. Robson and Scott instilled a solution of crude penicillin and found that the conjunctival sac

became sterile while a dramatic effect was evident on the corneal lesion. Sallmann used the sodium or the ammonium salt of penicillin in solution of 0.25 to 1 per cent, and when the intra-ocular infection was very severe he found the iontophoretic introduction of the drug into the eye the most effective method of therapy. The small amount of information available, therefore, is promising for future developments.

REFERENCES.—¹*Arch. Ophthalm.* 1942, **28**, 205; ²*Ibid.* 1943, **29**, 426, 690; ³*Ibid.* 1943, **30**, 352; ⁴*Ibid.* 1943, **29**, 888, 30, 65; ⁵*Trans. ophthalm. Soc. U.K.* 1943, **62**, 2; ⁶*Ibid.* 35; ⁷*Arch. Ophthalm.* 1943, **29**, 1000, 1930; ⁸*Trans. ophthalm. Soc. U.K.* 1943, **62**, 38; ⁹*Arch. Ophthalm.* 1940, **24**, 1189; ¹⁰*Ibid.* 799; ¹¹*Amer. J. Ophthalm.* 1941, **24**, 323; ¹²*Ibid.* 895; ¹³*Ibid.* 935; ¹⁴*Trans. ophthalm. Soc. U.K.* 1943, **62**, 15; ¹⁵*Amer. J. Ophthalm.* 1942, **25**, 332; ¹⁶*Arch. Ophthalm.* 1941, **25**, 299; ¹⁷*J. Mo. med. Ass.* 1941, **38**, 202; ¹⁸*Brit. J. Ophthalm.* 1943, **27**, 506; ¹⁹*Lancet*, 1941, **2**, 177; ²⁰*Ibid.* 1943, **1**, 100.

FACIAL PARALYSIS.

Macdonald Critchley, M.D., F.R.C.P.

The occurrence of tic-like movements in the face after injuries to the facial nerve is well known, and is sometimes regarded as a feature peculiar to this particular nerve. Kinnier Wilson did not agree that the facial muscles were more prone to develop a post-paralytic spasm than any others, but he believed that their "play"—as he called it—was more obvious since the muscle lay superficially. Be that as it may, these involuntary movements, described years ago by Sir Charles Bell and by Marshall Hall, are a common, distressing, and disfiguring complication. Dickson Wright¹ takes exception to the term 'tic'—and correctly so, for a tic connotes to a neurologist something rather different. "Clonic facial spasm" is probably the most appropriate term.

E. P. Fowler² has reopened this question of the abnormal facial movements following injuries to the facial nerve. Sir Charles Ballance believed that these clonic movements were central in origin; Fowler does not agree, but supports C. Ducl³ in believing that they are peripheral in nature. H. A. Howe, S. S. Tower, and A. B. Ducl³ have shown by experiments on monkeys that these clonic movements are due to splitting of axons in the neuroma—which always forms at the site of injury—resulting in innervation of several parts of the face by neurofibrils from a single axon. Fowler considers that these movements are pathognomonic of a peripheral nerve injury, and that one can assume from their presence that there must have been trauma or severe toxic disturbance of the nerve-trunk at some time.

Fowler believes that some degree of deliberate control of these movements is possible. Patients so affected should learn to reduce their emotional facial movements and to blink less frequently. They should learn to adopt a "dead pan" or "poker" face; and to train themselves in front of a mirror to smile out of the paralysed side of the mouth. Some are benefited by keeping a pipe or cigarette holder in the paralysed corner. Post-paralytic clonic movements are prevented, Fowler asserts, by early operation upon the injured nerve.

Operative Treatment of Facial Paralysis.—An interesting discussion upon this subject, and particularly upon the limitations of surgery, was held at the Royal Society of Medicine, with Miss D. J. Collier giving the opening paper.⁴ A Hunterian Lecture given by the same author⁵ also affords a good deal of interesting subject-matter.

Collier stresses the difficulty in determining clinically whether an injury to the facial nerve is complete or not. Paralysis first appearing two or three days after a mastoid operation cannot, of course, be the result of a loss of continuity. If the facial muscles respond to a faradic current without an anæsthetic, the prognosis is good, a physiological block rather than an anatomical severance being implied. The author mentions the differences between operative grafting of the facial nerve as opposed to other peripheral nerves. The facial canal forms a rigid channel into which the graft can be placed, and accurately apposed

to the ends of the divided nerve. Perfect approximation is possible. Grafts from the middle cutaneous nerve of the thigh are of suitable girth. The graft cannot shift, and being short, the axons have time to reach the distal end of the facial nerve before the weed-like growth of scar tissue. Sutures are unnecessary, because of the bony canal.

Paralysis coming on immediately after mastoidectomy calls for operation. If facial movements have been observed during the period between operation and the onset of paralysis, it is wise to wait a week or two. Should then the electrical reactions prove normal, spontaneous recovery can be expected. Reaction of degeneration on and after the tenth day is a bad omen and operation is indicated. With cases of traumatic facial paralysis first seen months or years after the injury, the indications are less dogmatic. Loss of galvanic response is an absolute contra-indication to any operation on the nerve.

A successful grafting operation depends upon: (1) the presence of a bony channel (if the aqueductus Fallopii is not present the surgeon must make an artificial canal); and (2) the finding of a central end of the nerve to which the graft is apposed.

Hæmorrhage may be a troublesome feature during the operation. Technical difficulty may also arise from the fact that the nerve-sheath is firmly attached to the periosteum of the canal.

Collier discusses the pros and cons of the degenerated graft (Ballance and Duel) versus the prepared graft (Bentley and Hill). She quotes Duel's dictum that "no case of repair of the facial nerve can ever be perfect". Clinically, returning function is first betrayed by a reappearance of tone to the paralysed muscles, whereby epiphora ceases. Voluntary power returns slowly to all muscles, except the frontalis. Emotional movements return, but at first they may not synchronize with those of the healthy side. Perfect symmetry of the face on movement cannot be expected after a graft operation, but gradual improvement may take place over a period as long as five years after operation. Collier considers that fibrosis within the muscle-substance may be responsible for the incompleteness of the end-results. Mass movements and facial synkinesia may occur, particularly if operation has been delayed. 'Tics' (i.e., clonic movements) may be present but not to an incommencing extent.

Immediately after nerve-grafting a facial splint should be worn. Physiotherapy is advisable, including controlled movements in front of a looking-glass. Galvanism should be avoided.

In her later paper, Collier states that there is a place for fibrin 'suture' of the facial nerve in grafting operations. F. S. Cooksey,⁶ in the discussion which followed this paper, pointed out that the electrical changes of the reaction of degeneration do not usually appear before ten days after the injury, and are not reliable before the fourteenth day. Some patients will not tolerate sufficient faradic current for investigation; testing may then be repeated under pentothal. Voluntary power usually returns some weeks before the faradic response reappears. Galvanism may be harmful and may retard recovery. T. Cawthorne⁷ drew attention to the value of the dissecting microscope during nerve-grafting operations, as practised by Dohlman.

REFERENCES.—¹*Proc. R. Soc. Med.* 1941, **34**, 583; ²*J. Amer. med. Ass.* 1939, **113**, 1003; ³*Arch. Neurol. Psychiat.* 1937, **38**, 1190; ⁴*Proc. R. Soc. Med.* 1941, **34**, 575; ⁵*Lancet*, 1940, **2**, 91; ⁶*Proc. R. Soc. Med.* 1941, **34**, 580; ⁷*Ibid.* 582.

FAMILIAL IDIOPATHIC METHÆMOGLOBINÆMIA.

Stanley Davidson, M.D., F.R.C.P.

H. W. Fullerton, M.D., M.R.C.P.

J. Deeny, E. T. Murdock, and J. J. Rogan¹ have described this rare condition as it occurred in two brothers and claim that this is the first time it has been

reported in Great Britain and Ireland. The outstanding features are cyanosis, usually dating from birth, and little disability apart from dyspnoea on strenuous exertion. Examination of the blood shows a high content of intracorpuseular methæmoglobin. Treatment by ascorbic acid and sodium bicarbonate caused the cyanosis to disappear in both their cases, and with continued treatment this change has been maintained for one year. The authors quote Lian, Frumusan, and Sassium who suggested that vitamin C might convert methæmoglobin to oxyhæmoglobin directly, but they do not refer to the possible value of the treatment in forms of methæmoglobinæmia other than the familial.

REFERENCE. - ¹*Brit. med. J.* 1943, 1, 721.

FINGER SUCKING.

Reginald Miller, M.D., F.R.C.P.

The possibly harmful effect of thumb-sucking on the formation of children's mouths is one of those subjects hotly debated in nursery circles and may give rise to opinions not lacking in extravagance. Consequently it is of interest to read a study of the subject made by J. H. Sillman,¹ based on 8 years' observations of 1000 newborn infants and a serial study of 50 children from birth to 5 years. His conclusions are that in all newborn infants the mandible is posterior to the maxilla, giving the chin the appearance of receding. From birth to 2 years the mandible grows forward faster than the maxilla. This contributes towards changing the features from those of a baby's face to those of a child's face. After 2 years this relationship of the jaws is generally maintained. Irregularities of the teeth are common in the first dentition, regardless of habit. Rotations of the incisors and molars are often present even before the teeth erupt. This point is extremely important to remember before finger sucking is said to be the cause of crooked teeth. Before and during eruption of the deciduous teeth, particularly the first incisors and first molars, the child's urge to bite is a physiologic process and usually passes uneventfully before the age of 3 years. During this time, heckling adults are apt to make suckers of non-suckers or to accentuate the force of sucking and create a habit. Under such conditions displacement of the teeth will occur. A force of certain intensity and duration will change the position of the teeth and the surrounding structures whether the force is applied with an orthodontic appliance or a finger, but one must be sure that such a force is operating. In any event the only area involved is the site of application, i.e., the anterior region. The force that maintains the mandible in its proper position is far greater than the force of the sucking. If by the age of 4 years the child persists in finger sucking, he should be helped to stop it. In instances in which sucking had caused crooked teeth, the displaced teeth corrected themselves spontaneously after the sucking was stopped.

REFERENCE. - ¹*N.Y. St. J. Med* 1942, 42, 2024.

FLUOROSIS.

Ralph M. F. Picken, M.B., Ch.B., B.Sc., D.P.H.

The toxic effects of fluorine as a public health problem have been the subject of investigation and some speculation in recent years. The earliest accounts of these effects were of gross manifestations in workers in industry exposed to fluorine or its compounds. Special attention to its importance in the general community has arisen from observations on mottling of the dental enamel as a result of consuming waters containing fluorine. The condition is characterized by the presence of white opaque spots or bands formed during calcification of the teeth, and sometimes in addition by brown-stained patches which penetrate to a third of the depth of the enamel and are believed to occur after eruption.¹ Several surveys revealing the condition have been done in America. The presence of the condition in this country was first fully described by N. J. Ainsworth.² He found it in a part of Essex where the water contained as much

as 5 parts per million of fluorine. Experimental bleaching of the teeth of rats has been produced by R. J. Evans and P. H. Phillips,³ and it has been shown by M. Lawrenz, H. H. Mitchell, and W. A. Ruth⁴ that the potential toxicity is two to five times greater when water is the vehicle of fluorine than if it is added to food.

Incidence of Mottled Enamel.—The frequency of the condition has apparently not been determined in any large community. For instance, its presence does not appear to have been noted when school-children in England and Wales were surveyed by a Dental Committee of the Medical Research Council in 1925, or in Lewis in 1937. Its occurrence is being established, however, in a growing number of places. H. T. Dean and his colleagues^{5, 6} have found it in several centres in America, and mention reports from Japan and the Argentine. C. G. Pandit⁷ has observed it in various districts of India, C. D. M. Day⁸ reported its presence in different degrees among 200 children in Kasur, Punjab, while D. C. Wilson⁹ states that there is a high degree of dental fluorosis in Hundewali, Punjab. She has also found 103 cases among 378 children in two villages of Somerset, and evidence of its presence in varying degrees in parts of Oxford, Northampton, and Gloucester. As the result of its detection among London evacuees during these investigations, she and M. M. Murray¹⁰ have surveyed 589 school-children of ages 10 to 15 resident in widely dispersed areas of London itself, among whom 116, or 28 per cent, were found to have definitely mottled teeth, while its presence was questionable in a further 258. L. Spira,¹¹ examining 5019 Service men and women, found mottled teeth in 1099, or nearly 22 per cent. The proportion was highest in those who had lived in Hertfordshire (86 per cent) and Northamptonshire (85 per cent). The percentage among Londoners was 23. C. N. Bromehead, M. M. Murray, and D. C. Wilson,¹ however, point out that it is the locality where the person resided up to about 14 years of age that governs the incidence. These surveys indicate that, if mottling, pitting, or bleaching of the teeth is to be accepted as being pathognomonic of fluorosis, the condition is frequent and widespread.

Relation to Fluorine Content of Water.—Observations in America⁶ have led to the conclusion that the minimum threshold of endemic dental fluorosis is 1 part per million of fluorine constantly present in the water-supply. C. N. Bromehead,¹² in a preliminary discussion of the geological aspect of the subject in this country, points out that fluorosis appears to be commoner among those who derive their water from wells in phosphatic beds or in clays of marine origin. The condition is absent in the same locality in households connected to a main water-supply. C. N. Bromehead, M. M. Murray, and D. C. Wilson¹ record further observations on the geological formations with which fluorine is associated, the local prevalence of mottled enamel, and the fluorine content of the water-supplies involved. Fluorine, they remark, may be found in association with fluorspar, apatite, and phosphate-bearing rocks, and Jurassic clays. They have estimated the amount of fluorine in water-supplies in a large number of localities of 12 widely separated counties of England and Wales. In only a few places have they found 1 or more than 1 part per million, and these are notable for the occurrence of fluorosis. The London water-supply varies from 0.35 in filtered New River to 0.15 in filtered Lea and 0.1 in filtered Thames. These, however, are not necessarily the concentrations which existed at the time when mottling of the dental enamel began in the London children surveyed by Wilson and Murray.¹⁰

Relation of Fluorosis to Caries.—Apparently the first hint that frequency of mottled enamel in this country might be associated with a relatively low incidence of caries was given by Ainsworth's work in Essex.² In the places where mottling was present and the water-supply had a high fluorine content

he found¹³ that the proportion of caries in permanent teeth was 7.9 per cent, as against 13.1 per cent on the average in widely dispersed areas in England and Wales, and that for deciduous teeth the corresponding percentages were 12.9 and 43.3. In America, H. T. Dean⁵ found in South Dakota that the average number of carious teeth per hundred children varied from 201 in counties where mottling was generally prevalent, and 314 where mottling was unevenly distributed, to 415 where it had never been reported. In 4 towns of Colorado and 8 of Wisconsin a fairly close inverse relation existed between caries and mottled enamel and also the ascertained fluorine content of the water. In a later investigation H. T. Dean, P. Jay, F. A. Arnold, and E. Elvove⁶ found that 4 suburban districts of Chicago with water-supplies containing 1.2 to 1.8 parts per million of fluorine had caries-rates in school-children, age 12-14 years, of 252-323 per 100 children, whereas in 3 others where the water was fluorine-free the caries-rates were 673-810. The incidence of mottled enamel in the former group was 25-40 per cent, but only 0.2-1.6 in the latter; the degree of mottling was nowhere of public health or æsthetic significance. The inference was that drinking water at or just below the threshold of fluorine content for the production of mottling may be beneficial to the public health, at least so far as caries is concerned. M. M. Murray and D. C. Wilson¹⁰ confirm the negative association between caries and mottled enamel in London children, caries being roughly four times as frequent among those without mottling as in those with it. S. B. Finn and H. C. Hodge¹⁴ have shown experimentally that caries can be inhibited in rats fed with potassium fluoride, and F. J. McClure¹⁵ that it is partly prevented by the presence of 10 parts per million of fluorine in drinking water.

Endemic Goitre and Fluorosis.—D. C. Wilson⁹ states that she obtained a history of endemic goitre and cretinism in many areas of India where fluorine was recognized geologically, and that she found a high degree of dental fluorosis in a goitrous area of the Punjab. The known distribution of fluorine in the soil of England corresponds closely with the present or former distribution of endemic goitre. In a survey of two villages in Somerset having a record of high goitre incidence, she found dental fluorosis in 55 of 378 children, whereas the condition was absent in an adjoining area where goitre was not recorded. In this connection it may be noted that L. Goldemberg¹⁶ has claimed beneficial results from the treatment of thiorotoxicosis with sodium fluoride administered intravenously and by mouth. H. Christiani¹⁷ found that proliferation of the parenchymatous and, more rarely, of the interstitial tissue of the thyroid gland was produced in guinea-pigs by small doses of fluoride over a prolonged period.

Other Manifestations of Non-industrial Fluorosis.—F. H. Kemp, M. M. Murray, and D. C. Wilson¹⁸ have examined the occurrence of spondylitis in areas where mottled enamel is prevalent. They quote ten cases reported by Shortt et al. in adults in Madras Presidency leading to complete immobility of the vertebræ and of the articulations of the ribs, the water-supply having 3-4 p.p.m. fluorine. They mention that cases have also been reported among natives around Pretoria in South Africa. Their own observations of 27 people in this country are inconclusive. They found several children and young adults with disturbances of the ossification of the spine and early signs of spondylitis osteo-arthritis, and these were commonly associated with dental fluorosis, but the correlation was irregular. Such changes, though less definite, occurred in children from an area where other signs of fluorosis are rare. They conclude tentatively that fluorine in water and soil may favour mal-development. On the other hand, P. C. Hodges, O. J. Fareed, G. Ruggy, and S. S. Chudnoff¹⁹ have found no sign of skeletal fibrosis in subjects exposed for many years to 3 p.p.m. of sodium fluoride in drinking water.

L. Spira²⁰ holds that fluorine ingestion acts by causing disturbance of the parathyroid glands and that its manifestations are to be seen in the organs and processes regulated by these glands. Among the signs he includes dermatoses (urticaria, furunculosis, dhobi-itch, cheiopompholyx, and dysidrosis), dystrophies of the finger- and toe-nails under an inclusive designation "mottled nails", and loss of hair. He has described in detail and illustrated the nail conditions to which he refers.²¹ He regards the pathological condition as parathyroid insufficiency brought about by disturbance of the calcium metabolism. In experimental induction of acute fluorosis in dogs R. Gerschmann²² had shown that injection of sodium fluoride caused hypocalcemia and that recovery was probably effected by the action of the parathyroid secretion.

Prevention of Fluorosis.—Bromehead,¹² in the belief that the fluorine in water is derived from the geological formations in which well-water gathers (in particular Oxford Clay, Lower Lias, and Kimmeridge Clay), urges the avoidance of such wells and the connection of dwelling-houses to a main-supply in areas where the risk exists. Deep wells bored through fluorine-bearing beds are safe if they are lined with steel tubing. Spira,²³ on the other hand, considers that fluorosis is so widespread in this country that well-water cannot always be incupated. He suspects that fluorine gains access to water from filter powder (Kieselguhr) which contains variable quantities of the element, from cement and iron storage tanks, iron pipes, and aluminium cooking vessels. L. Spira and F. H. Grimbleby²⁴ have therefore examined methods of removing fluorine from water as a measure of prevention, and conclude that the most practicable method would be boiling for 5 minutes followed immediately by filtration, which, in their experiments, can reduce the concentration by 75 per cent. M. M. Murray and D. C. Wilson,²⁵ however, failed to confirm these results when experiments were made with natural waters having a high fluorine content. It would appear therefore that, in so far as fluorosis from water-supplies is a real danger to health, satisfactory means of prevention must await more precise information as to the nature of its manifestations and their distribution, the relation of these to the source of water consumed during calcification of the teeth, other means by which fluorine may continuously or repeatedly gain access to water, and methods of removing excessive quantities of it. If, on the other hand, quantities beneficial in the prevention of dental caries can be proved to be non-toxic, the practical problems will assume a different and more complex character, involving not only those waters which have a high fluorine content but also those where it is low or absent.

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FOOT, IMMERSION. (See FOOT, SURGERY OF; IMMERSION FOOT.)

FOOT STRAINS, ACUTE.

T. P. McMurray, F.R.C.S.

The condition of acute strain of the foot without mechanical alteration in the longitudinal or transverse arches is seen only occasionally in civilian life following some unaccustomed and prolonged effort. It may occur also in young patients who have taken up a trade which involves continuous and prolonged standing, or the carrying of heavy weights. The strenuous physical training which is now a recognized part of army routine, has thrown such increased burden on

the feet of the young soldiers that complaints of varying degrees of foot strain are of comparatively common occurrence.

Several papers dealing with this problem from varying angles have been published in the past year (Osgood,¹ and others²), and although the authors differ somewhat in their explanations of its development, they agree largely on its method of causation, and on the treatment which should be adopted for its alleviation.

It can be accepted that a foot is not necessarily weak or liable to develop pain solely on account of some obvious deformity, such as hallux valgus or hammer-toe, or even because of an apparently severe degree of flat-foot. Although such deformities may give rise to trouble, the cause of pain in these deformed feet, especially among soldiers, is the excessive muscular fatigue which eventually leads to strain of the supporting ligaments of the foot. Even with an apparently badly designed shoe it is possible to have complete foot comfort, so long as the muscle balance is adequate, but if this control is lost the weakness and disability of the foot are greatly exaggerated if there are already present various deformities of the toes and tarsus.

The foot has two obvious functions, balance and propulsion; for each of these functions muscular contractions are essential, their importance being greater in propulsion than in balancing. Fatigue and strain of muscle are inevitable for both normal and abnormal feet during the process of intensive physical training of the army recruit, and no permanent damage to the feet will occur if these early strains are treated rapidly and rationally. In maintaining the normal arch of the foot the plantar fascia acts like the string of a bow, being attached posteriorly to the os calcis, and anteriorly to the base of the toes. Unsupported the fascia cannot retain its normal length and strength against the pull of the tendo Achillis and the weight of the body. It is normally supported and protected from strain by the flexor muscles of the toes, and especially by the short muscles of the sole of the foot, particularly the flexor brevis digitorum which arises from its upper surface. When strain is applied to the fascia the flexor brevis muscle contracts in an effort to relieve the fascia and to protect it from stretching. If the tone of the short muscles of the sole is lost, either permanently or temporarily, strain is applied directly to the unsupported fascia and to the deeper ligaments of the foot, which gradually yield, causing acute pain and disability. Patients suffering from a strain of the fascia and weakness of the short plantar muscles walk with the toes acutely dorsiflexed. The walk is shuffling rather than springy, as the toes cannot act in the normal manner to support and reinforce the action of the plantar ligaments. For the same reason, patients suffering in this way find that standing on tip toe is an impossibility, as in this position use of the long and short toe flexors is a necessity.

On examination, such a foot is mobile but the power of flexion of the toes against resistance is definitely reduced, and the effort of flexion is followed by pain in the middle of the sole of the foot. When the plantar fascia itself has been strained tenderness and pain are present, either at the posterior or at the anterior attachment of the ligaments. If the posterior attachment is strained, tenderness on pressure is found under the os calcis, while with strain at its anterior attachment tenderness is usually present below and slightly in front of the heads of the 2nd, 3rd, and 4th metatarsals, the fascial insertion into the flexor sheath of the great toe never being involved.

In dealing with all degrees of foot strain, adequate and immediate treatment is essential; it is not sufficient to recommend alterations to shoes, or the provision of foot plates which may obscure the acute symptoms but cannot affect the primary disability. Recumbency is always necessary; the muscle

balance of the foot must be restored ; swelling, tenderness, and muscle spasm must be relieved by a short period of rest, with which may be combined a course of radiant heat or hot packs, followed by a redevelopment of the power of the supporting muscles. Occasionally, when the toes have become fixed in deformity it may be necessary to correct the position and maintain the foot in a plaster case for a short period before undertaking the essential muscular re-education.

REFERENCES.—¹*New Engl. J. Med.* 1942, 226, 552 ; ²*Proc. R. Soc. Med.* 1942, 36, 47.

FOOT, SURGERY OF.

Lambert Rogers, M.Sc., F.R.C.S.

Nail Puncture Wounds.—Puncture of the sole of the foot by a nail may be troublesome to the patient and a source of anxiety to his medical attendant, who must decide how radical treatment should be. Every case calls for the administration of tetanus antitoxin and few patients nowadays would fail to be given sulphonamides also, but opinion will vary as to the local treatment of the puncture wound. A report of 661 of these wounds therefore constitutes a highly important paper. This comes from F. H. Bowen¹ of North Carolina, who treated patients who had sustained such wounds during the construction of a naval air station. As a result of his experience he evolved the following treatment : The foot is soaked for 15 minutes in hot water to which liquid soap or saponified cresol is added. It is then dried and an area around the wound about two or three inches across is painted with tincture of mercuric (ortho-hydroxyphenylmercuric chloride). The wound edges are grasped with splinter forceps and the epidermis is cut away for several millimetres about the circumference of the wound. Foreign matter is thereby exposed and can be removed. The wound is not probed beyond a quarter of an inch, and this is done under direct vision in case infection should be spread. A dry dressing is applied, and 1500 units of tetanus antitoxin are given. In Bowen's 661 cases there were no deaths and no tetanus, and in small wounds the patient returned to work at once. In more severe cases the patient was kept off work for one or two days and made to soak his foot several times in hot water with the object of dilating capillaries and promoting the exudation of lymph. Chemotherapy was not used, and the cases under consideration were all treated on the day of injury. In advocating conservative treatment along these lines the author points out how the nail is wiped clean in the proximal part of its entry, and the staircase-like tract produced by the tendency of the layers constituting the sole to slide one over the other ; hence treatment to be logical must lie between being either very radical or very conservative. [The proof of the pudding is always in the eating, however, and these 600 cases clearly show the efficacy of conservative treatment along the lines described. Most surgeons would favour re-inforcing such, however, by chemotherapy with the sulphonamides.—L. C. R.]

Immersion Foot.—This condition has been considered at some length in recent issues of the MEDICAL ANNUAL (1942, p. 137 ; 1943, p. 175), but more recent surgical aspects are worthy of reference here. J. C. White² of Boston distinguishes between true immersion foot secondary to exposure and cold and in all respects similar to trench foot or frost-bitten foot, and the painful swollen feet secondary to prolonged dehydration and malnutrition seen in those shipwrecked in the tropics. While the former condition is produced by sublethal injury to the chilled tissue cells, the cutaneous articular and capillary bed, and the nerve-fibres, the latter is probably due to hypoproteinaemia and a deficiency of vitamin B and possibly also K as well. Both conditions produce painful oedematous feet, but the pathogenesis is different in the two cases.

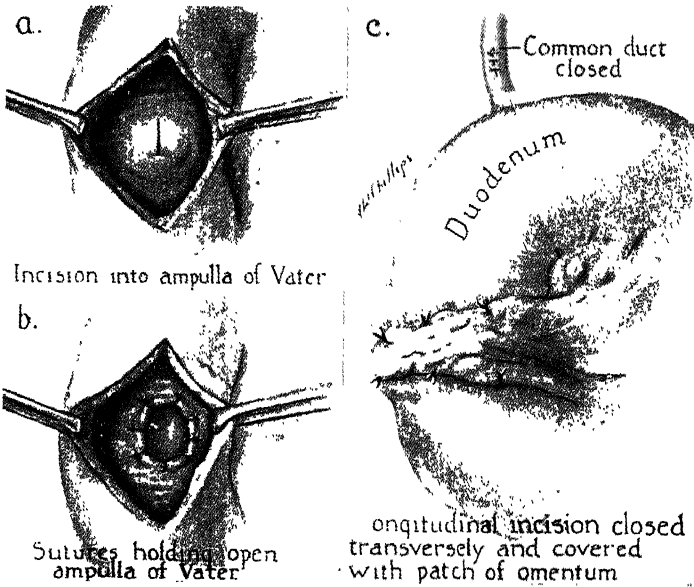
TREATMENT.—

a. Immersion Foot.—The skin of the feet and legs should be gently cleansed with soap and cold water and raw areas dusted with sulphanilamide powder.

PLATE XI

GALL-STONE COLIC WITHOUT GALL-STONES

(J. E. STRODE)



a, Incision into the ampulla of Vater; b, Procedure of holding open the ampulla; c, Method of protection of the incision into the duodenum.

Reproduced from the 'Annals of Surgery'

The feet should be kept cool by exposure to the room air, no bedclothes being allowed below the knees. Air temperature should be below 70° F. and an electric fan allowed to play on the feet and legs which should be elevated above the level of the heart. Codeine and morphine are used to control pain and the patient must be kept rigidly in bed so as to avoid the dependent position for his legs and feet.

b. Painful Oedematous Feet from Exposure in Warm Climates.—The most urgent need is the correction of dehydration and malnutrition. A high protein intake, adequate fluids, and correction of the vitamin deficiency are called for. White advises daily intramuscular injections of thiamine chloride 50 mg. and Lederle's vitamin B complex, 10 c.c. (this contains thiamine, nicotinic acid, and riboflavin).

Sympathectomy.—C. C. Ungley³ has pointed out that cold produces an effect comparable with post-ganglionic sympathectomy, and despite some papers advocating sympathectomy as part of treatment in the acute phases, not only would there appear to be absolutely no grounds for the procedure but rather would it appear to be directly contra-indicated. E. D. Telford,⁴ also in a recent paper on sympathectomy in the cryopathies—a term which he uses to include conditions such as frost-bite, immersion foot, trench and shelter foot, emphasizes the fact that in the acute phases of these conditions, sympathectomy, like rapid warming, can only be harmful. It may be valuable, however, for the later sequelæ of some cases in which there is a combination of sclerosis and defective blood-supply which may be manifested in various ways such as by chronic pain, ulceration, persistent indurated swelling, the Raynaud phenomenon, or hyperhydrosis. In Professor Telford's clinic in Manchester, pre-ganglionic sympathectomy has been carried out with gratifying results in five of such cases.

(See also articles IMMERSION FOOT; MEDICINE IN RELATION TO SHIPWRECK.)

REFERENCES.—¹J. Amer. med. Ass. 1942, 119, 413; ²New Engl. J. Med. 1943, 228, 211; ³Proc. R. Soc. Med. 1943, 36, 518; ⁴Brit. Med. J. 1943, 2, 360.

FRACTURES. (See MECHANICAL SKELETAL FIXATION IN WAR SURGERY.)

GALL-BLADDER, SURGERY OF.

A. Rendle Short, M.D., F.R.C.S.

Gall-Stone Colic without Gall-stones.—J. E. Strode,¹ of Honolulu, discusses this by no means infrequent condition. He attributes the colic to biliary dyskinesia, that is to say, contraction of the gall-bladder during spasm of the ducts or their sphincters. Surgeons are at a loss to know what to do when no stones are found, even after careful exploration of the ducts. Strode advises opening the duodenum and enlarging the orifice of the ampulla of Vater (*Plate XI*). This procedure deals directly with the cause of the attacks of pain.

K. M. Lewis and C. W. Peterson,² of New York, on the other hand, report 25 cases of cholesterosis of the gall-bladder, in 19 of which typical biliary colic was complained of. Cholecystograms were inconclusive; only five showed non-visualization of the gall-bladder. The treatment was cholecystectomy. Of 20 cases followed up, 14 were cured, 4 relieved as long as they adhered to a fat-low diet, and 2 not improved. [This accords with the general experience, and is not very satisfactory.—A. R. S.]

Bacteriology.—Two surgeons at Cordoba, Argentina, G. Elkeles and P. L. Mirizzi,³ find that the bile of the common duct is often sterile, and indeed strongly bactericidal, when disease of the rest of the apparatus is present. Stones in the duct are the usual cause, when choledochal bile is found to be infected.

Cholecystitis.—The question of the right time to operate for patients with acute cholecystitis has been much discussed for years past. A contribution to

the problem is made by Major R. Zollinger and Col. Elliott C. Cutler.⁴ They advise that even mild cases should be in hospital and their response to conservative treatment carefully studied. Sufficient time must be allowed to combat dehydration; an emergency operation is seldom necessary. Their mortality, in 146 cases, was 2.6 per cent. In about 15 per cent there were stones in the common duct.

J. H. Saint,⁵ of California, writes on the same subject. He suggests that the role played by obstruction, as well as infection, is so important that the disease might well be called "acute obstructive cholecystitis." The tension may be so great that the blood-supply is compressed and gangrene results, leading to perforation or peritonitis. The main indication for surgical intervention is the development of a tender, palpable gall-bladder in the course of the illness. He only lost one patient out of 44 operated on.

Francisco C. Royo⁶ maintains that in Spain, chronic and larval cholecystitis and cholangitis, as shown by bacteriological examinations of the bile, are very frequent in females between eight and forty years of age, though there may be but few obvious symptoms of the disease. He has carefully studied over a hundred cases. The usual organisms found are the enterococcus, *B. coli*, and the pneumococcus. The troubles resulting from the infection may be many and various. He recognizes the following types: (a) the *dyspeptic*, (b) the *rheumatic*, (c) a type simulating *appendicitis* or *typhilitis*, (d) a type resembling *malaria*, (e) cases with *urinary symptoms*, such as bacteriuria, albuminuria, pyelo-nephritis or cystitis, (f) a *nervous type* with labyrinthitis or multiple sclerosis, and (g) a type with *skin manifestations*, such as psoriasis, eczema, or urticaria.

[It does not follow that because bacteria are found in the bile, therefore this infection is the cause of such very varied groups of symptoms, but the practitioner may well bear in mind the possibility of an infected gall-bladder when seeking for a source of poisoning somewhere in the patient.—A. R. S.]

Surgical Technique.—F. H. Lahey⁷ believes that the usual approaches to the gall-bladder and ducts are not satisfactory. He advocates the following technique. Spinal anaesthesia is used, because of the relaxation obtained. If desired, gas, or intravenous pentothal, may be given in addition. There have been no anaesthetic deaths, and no neurological complications in his clinic, though the cases number 15,000. An incision of ample length is made. The duodenum and the colon are packed off with wet swabs and retracted to the left. A clamp is placed on the ampulla of the gall-bladder to pull it up and expose the ducts. A gauze strip is pushed into the foramen of Winslow; if infected bile is spilled, this will absorb it. The hepatic and cystic arteries are thus rendered visible and accessible. Torn accessory ducts, which would leak bile, can be controlled. It is these ducts which are usually responsible for post-operative accumulations of bile in the peritoneal cavity. The cystic artery is found and tied; then the ducts are dissected out, and the cystic duct tied.

R. B. Battman and G. M. Lichtenstein,⁸ of Chicago, advocate closure of the abdomen, without drainage, after cholecystectomy, except in the presence of acute infection, or after opening the common duct. They had 306 cases in which no drain was used, and none of them came to any harm in consequence.

For drainage of the common duct, A. W. Allen and R. H. Wallace,⁹ of Boston, use a whistle-tipped rubber tube. It is important to see that bile is draining through the tube before the abdomen is closed. The drain is brought out through a lateral stab-wound, not through the main incision.

The best method of reconstructing a damaged or strictured common duct seems to be by the introduction of a flanged vitallium tube. H. M. Clute¹⁰ reports a very successful case. It can remain in the body indefinitely without doing any harm.

Congenital Cystic Dilatation of the Common Bile-Duct.—A complete review of the reported examples of this uncommon disease is made by T. A. Shallow and colleagues,¹¹ of Philadelphia. They find records of 175 cases and add one of their own. The patients are mostly female, either children or young adults. It appears to be a congenital malformation. The lower end of the duct is constricted or angulated. The liver may be enlarged or cirrhotic. The diagnosis rests on the triad of tumour, jaundice, and pain. In practice, only 22 cases were correctly interpreted before laparotomy. The proper treatment is to anastomose the dilated duct to the duodenum; if possible, it is better to extirpate the cyst as well. The mortality has been high, about 58 per cent, but it was only 27 per cent in those patients in whom a primary anastomosis of the biliary and intestinal tracts was carried out.

REFERENCES. —¹*Ann. Surg.* 1943, **117**, 198; ²*Ibid.* 450; ³*Ibid.* 1942, **116**, 360; ⁴*J. Amer. med. Ass.* 1943, **121**, 481; ⁵*Surg. Gynec. Obstet.* 1942, **75**, 323; ⁶*Med. exp.* 1942, **8**, 366; ⁷*Surg. Gynec. Obstet.* 1942, **75**, 445; ⁸*Ann. Surg.* 1942, **116**, 928; ⁹*Ibid.* 273; ¹⁰*New Engl. J. Med.* 1942, **226**, 484; ¹¹*Ann. Surg.* 1943, **117**, 355.

GASTRIC AND DUODENAL ULCER: MEDICAL ASPECT. (See also DYSPEPSIA IN THE SERVICES.) *Sir Henry Tidy, M.D., F.R.C.P.*

Genesis of Peptic Ulcer in Man.—S. Wolf and H. G. Wolff¹ (New York) have had the opportunity of making observations on a man aged 56 who at the age of 9 years completely occluded his œsophagus by drinking scalding fluid. Since then he has fed himself through a gastric fistula 3.5 cm. in diameter, surgically produced shortly after the accident. It is his custom to put food into his mouth and after tasting and chewing it to expectorate it into an ordinary kitchen funnel inserted into his stoma. Through the stoma has protruded on his abdominal wall a collar of gastric mucosa essentially similar to that within the cavity of the stomach. The summary of their observations is as follows:—

1. Acid in small amounts was continuously elaborated in the subject under basal conditions.

2. Spontaneous transitory phases of accelerated secretion of acid occurred from time to time. These were accompanied by blushing of the mucous membrane and vigorous contractions of the stomach wall.

3. Emotions such as fear and sadness, which involved a feeling of withdrawal, were accompanied by pallor of the gastric mucosa and by inhibition of acid secretion and contractions. This complex was encountered infrequently.

4. Emotional conflict involving anxiety, hostility, and resentment was accompanied by accelerated acid secretion, hypermotility, hyperæmia and engorgement of the gastric mucosa resembling "hypertrophic gastritis". This series of events was much more commonly observed. It was associated with gastrointestinal complaints of the nature of heartburn and abdominal pain.

5. Intense sustained anxiety, hostility, and resentment were found to be accompanied by severe and prolonged engorgement, hypermotility, and hypersecretion in the stomach. In this state mucosal erosions and hæmorrhages were readily induced by even the most trifling traumas, and frequently bleeding points appeared spontaneously as a result of vigorous contractions of the stomach wall.

6. Contact of acid gastric juice with such a small eroded surface in the mucous membrane resulted in accelerated secretion of acid and further engorgement of the whole mucosa. Prolonged exposure of such a lesion to acid gastric juice resulted in the formation of a chronic ulcer.

7. The lining of the stomach was found to be protected from its secretions by an efficient insulating layer of mucus, enabling most of the small erosions to heal promptly within a few hours. Lack of such a protective mechanism in the duodenal cap may explain the higher incidence of chronic ulceration in this region.

8. It appears likely, then, that the chain of events which begins with anxiety and conflict and their associated over-activity of the stomach and ends with hæmorrhage or perforation is that which is involved in the natural history of peptic ulcers in human beings.

Relative Incidence of Gastric and Duodenal Ulcers.—J. B. Cleland² (Adelaide) has investigated the relative incidence in South Australia during the last 22 years. He finds that gastric ulcer exceeds duodenal ulcer. The following conclusions are based on 5000 autopsies. (1) Gastric ulcers (110) decidedly exceed duodenal ulcers (70). This relationship is shown to have existed for the last 22 years. (2) Up to the age of 50 years gastric and duodenal ulcers are about equally common. After this age the gastric ulcers increase considerably, but not the duodenal ulcers. (3) Gastric ulcers are four times as common in men as in women. Duodenal ulcers are relatively rare in women, the proportion of men to women being about 7 to 1.

Treatment of Hæmatemesis and Melæna.—F. Avery Jones³ (London) reports the result of treatment by *prompt feeding and liberal blood transfusions* in 171 consecutive admissions for recent frank hæmatemesis and/or melæna between June, 1940, and December, 1942; 123 cases were confirmed as due to various types of peptic ulcer. In 34 other cases the diagnosis was uncertain, but peptic ulcer probably accounted for 161 cases. Gastroscopy was performed in cases of doubtful diagnosis within a few days of the hæmorrhage but a barium meal was not usually given until the third or fourth week. Early gastroscopy thus revealed 21 cases of acute gastric ulcer which were not shown by later radiology. The age-incidence showed that 30 per cent of cases were over 60 years, which is much higher than in previous series quoted. The author considers that the higher age-incidence is due partly to the claim of the Services on younger persons, partly to the high percentage of older patients sent to his hospital, and partly to the possibility that war conditions have caused an increase in peptic ulceration among the elderly. Treatment followed the lines of prompt feeding and liberal transfusion. There were 17 deaths, i.e., 10 per cent, which is higher than in previous series, but of the fatal cases 9 had severe complications; 9 were over 60 years of age and 9 had simple ulcers more than 3 cm. in diameter. To test the efficiency of the method of treatment the series is compared with records from St. Bartholomew's Hospital in 1926–30 on a régime of starvation and only small transfusions. The total mortality has been more than halved in spite of the higher age-incidence in the recent series. The reduction in mortality has been effected partly because recurrent hæmorrhages are less frequent under this mode of treatment and partly because when they do occur the patients are better fitted to withstand them. The author discusses the indication for operation. The necessity for continued massive transfusion is not in itself sufficient reason for operation. Four patients with acute gastric ulcers had repeated severe bleeding and needed some four to twelve litres of blood respectively, but with routine medical treatment the hæmorrhage eventually stopped.

REFERENCES.—¹J. Amer. med. Ass. 1942, 120, 670; ²Med. J. Aust. 1942, 2, 205; ³Brit. med. J. 1943, 1, 689.

GASTRIC AND DUODENAL ULCER: SURGICAL ASPECT.

A. Rendle Short, M.D., F.R.C.S.

Vitamin Deficiency.—C. C. Lund,¹ of Boston, has found that the diet of patients with peptic ulcer is often low in vitamin C, and when they come to operation, the ascorbic acid level in the blood is below normal. In a small series of cases, he found that complications and deaths amongst patients treated by gastro-enterostomy were more frequent in those with vitamin deficiency, but this difference did not show amongst those treated by partial gastrectomy.

Choice of Treatment.—On this subject varying opinions continue to be expressed. An Indian surgeon, B. B. Hajra,² who deals with a class of patients who live on a coarse diet but little above starvation level, allows that partial gastrectomy is necessary for gastric ulcers, but for the much commoner duodenal ulcers he chooses gastro-jejunostomy. The usual indication was pyloric stenosis. He had 100 consecutive cases without a death, and in only 5 was the clinical relief of symptoms unsatisfactory. C. F. M. Saint,³ of Cape Town, writes concerning duodenal ulcer, "*Gastro-enterostomy*, posterior, is the operation of choice. It is generally recognized that it is most successful where cicatricial contraction and obstruction are present, but it is a thoroughly good operation in those cases, even without obstruction, where medical means have failed to help. One must acknowledge that it is, however, in this class of cases where failures are more likely. *Gastrectomy* was introduced some years ago and had a short, enthusiastic run, but it is safe to say that very few surgeons hold any brief for it now, except where other operative measures have already been tried and have failed. Even then it is by no means a guarantee against recurrent peptic ulceration. One cannot fairly compare the results of medical with surgical treatment, because the surgeon only operates on those patients where conservative measures have failed." Whatever may be the practice in South Africa, there are certainly many surgeons in America, and in Britain, who advocate partial gastrectomy as the routine treatment for duodenal ulcer in those cases where surgery is judged necessary.

J. W. Hinton,⁴ of New York, maintains that the mere fact that there is X-ray evidence of pyloric obstruction is not sufficient to warrant operation; the only indication for surgery is persistent pain in spite of medical treatment. The only justifiable operation is subtotal gastrectomy, removing 65 to 70 per cent of the stomach, combined with resection of the ulcer. Of 104 patients so treated in his clinic, 65 per cent were cured, 25 per cent improved, which usually means that they had no pain but did not gain weight. The mortality was 5 per cent. He condemns gastro-enterostomy, because when followed up for seven years, there were only 24.5 per cent cures, and 18.8 per cent developed a gastro-jejunal ulcer. The resection of the duodenal ulcer is greatly helped if the stomach is cut across and turned to the right to obtain good access. Writing elsewhere, Hinton⁵ mentions that only 14 per cent of the patients treated for duodenal ulcer in the clinic (excluding some who had already suffered from surgery) were thought to be in need of operation.

That the dangers of a partial gastrectomy can be reduced substantially is demonstrated by a paper by Norman C. Tanner⁶ [one of my own students.—A. R. S.]. He discusses gastric surgery in the aged, and records recoveries from perforated ulcer at seventy-seven and seventy-nine after simple closure, and 120 partial gastrectomies for duodenal, gastric, and gastro-jejunal ulcers with only one death. He considers that prophylactic treatment with sulphapyridine is a valuable safeguard against peritonitis and pneumonia. Of 40 patients between sixty and seventy, 33 recovered; in half of these gastrectomy was performed, and in the other half gastro-enterostomy. In the Lahey Clinic, according to a paper by F. H. Lahey and S. F. Marshall,⁷ the mortality figure for partial gastrectomy for the three types of ulcer has been brought down to 2.7 per cent.

When a duodenal ulcer is so low that it involves the ampulla of Vater, an attempt to remove will be too dangerous, and a simple gastro-enterostomy, or Finsterer's resection for exclusion, will be the operation of choice. If the ulcer is a little higher, it may be feasible to excise, and then to insert a long-limbed T tube into the common duct and through the sphincter. The stem of the T is brought out through the abdominal wall.

Howard Clute and J. S. Sprague,⁸ of Boston, write in favour of gastro-duodenostomy for patients with pyloric stenosis. They consider that the after-results are better than gastro-enterostomy and gastro-jejunal ulcer does not occur. The operation is not recommended for the treatment of hæmorrhage, when excision is better.

A. W. Allen,⁹ of Boston, remarks that there is widespread agreement amongst surgeons that for patients with duodenal ulcer whose pain cannot be relieved medically the proper operation is partial gastrectomy with excision of the ulcer, but many regard gastro-jejunostomy as sufficient in the presence of stenosis. He thinks that even in these cases the gastrectomy is better, because he has seen three examples of gastro-jejunal ulcer follow the lesser operation.

M. T. Friedell and colleagues,¹⁰ of the Mayo Clinic, state that reduction of gastric acidity is obtained in 75 per cent of cases of duodenal ulcer treated by partial gastrectomy, and this affords a good prognosis. The most resistant cases are those with a history of perforation or gastro-jejunal ulceration, and in these patients a larger portion of stomach should be removed.

A particularly careful and personal follow-up of 104 cases of ulcer treated by partial gastrectomy is recorded by R. E. Church and J. W. Hinton.¹¹ Of these, 65.9 per cent were cured, 24.7 per cent benefited, and 9.2 per cent were failures. Too small a resection was the usual cause of recurrence of symptoms.

The Life of the Gastrectomy Patient.—Under this title, an Argentine surgeon, R. Delgado,¹² describes his investigation of some 75 such cases. His mortality after operation was 2 per cent in 500 patients, and only one developed a gastro-jejunal ulcer. Cures were reckoned at 96 per cent: the other patients still suffered from symptoms of gastritis. The stomach remains smaller than normal for about three months, and a feeling of distension may be complained of after meals. Post-operative anæmia was not seen. Digestion was good, and patients put on weight.

In a thorough study of a small number of patients following partial gastrectomy, J. H. Mulholland and team,¹³ working in New York, found that during the first week or two there is a considerable drop in nitrogen balance, body weight, and plasma proteins. This is not made up by blood transfusions. They recommend feeding with a digested protein mixture called amigen by way of a tube passed through the nose, œsophagus, and stomach into the jejunum. They do not pretend that the method is comfortable, nor that the protein mixture is palatable.

Jejunostomy for Peptic Ulcer.—R. Colp and L. J. Druckerman,¹⁴ of New York, report on a series of 51 cases. In some of these the jejunostomy was performed because the gastric ulcer was too large to be excised; in 25 cases the patient had already had an operation on the stomach. When it was the primary operation, it was followed later by a partial gastrectomy when the ulcer had diminished in size and the patient improved in health. In other cases, the jejunostomy was performed at the same time as an operation on the stomach, with a view to combating atony or dilatation and feeding the patient from the first. In yet other cases, the jejunostomy was carried out after such symptoms had developed.

Gastro-ileostomy.—It is, of course, a gross surgical error to anastomose the stomach to the ileum in mistake for the jejunum, but cases do occur from time to time. A certain number which have turned up at the Mayo Clinic are reported on by Lucian A. Smith and A. B. Rivers.¹⁵ The patient usually complains of diarrhœa and wasting, often with vomiting and pain. The diarrhœa is shortly after taking food. A gastro-ileal anastomotic ulcer may develop. A barium meal will give the correct diagnosis. Treatment is to undo the faulty anastomosis, and to deal with the original duodenal ulcer as seems suitable.

It may be healed and no further treatment called for, or gastrectomy, or gastro-enterostomy, may be indicated.

Gastro-jejuno-colic Fistula.—According to J. S. Atwater and colleagues,¹⁶ of the Mayo Clinic, about 11 to 14 per cent of gastro-jejunal ulcers penetrate into the colon. The patients are nearly all males and in middle life. The usual symptoms are diarrhoea, and faecal vomiting or belching. There is great loss of weight. A good deal of preliminary treatment is necessary to bring the patient into a fit state for operation. The essential surgical procedure is resection of stomach after undoing the anastomosis. Sometimes a preliminary colostomy is valuable. The death-rate was 27 per cent.

F. H. Lahey⁷ operates in two stages. At the first the ileum is divided and both ends closed, and a side-to-side anastomosis made between the ileum and the descending colon. This diverts the alimentary contents from the fistula, and a considerable improvement of health follows. Two months later, a big excision, all in one piece, is undertaken, removing the distal stump of ileum, the right colon, the anastomosis with the ulcer and fistula, and two-thirds of the stomach. The duodenum is closed, the jejunum re-established by lateral or end-to-end anastomosis, and a typical Hofmeister anastomosis of the stump of the stomach and the jejunum completed. Of 8 cases so treated, 1 died. The operation sounds formidable, but it is a great advantage not to have to open the fistulous area, with the risk of fouling the peritoneum.

PERFORATIONS OF GASTRIC AND DUODENAL ULCER

Four publications may be noted, three American, by H. Ulfelder and A. W. Allen,¹⁷ C. Harrison and F. W. Cooper,¹⁸ and F. X. Timoney,¹⁹ and one Spanish by A. Matute.²⁰ It is remarkable that so few women perforate (4 per cent of the whole group, according to Ulfelder). The general mortality shows little change in the past fifteen years in Ulfelder's series, but Timoney has reduced the mortality from 19.5 per cent to 4 per cent by insufflating sulphanilamide powder in the peritoneal cavity. In those so treated, abdominal wound infections were only seen in 8 per cent, whilst without the powder 25 per cent of the wounds showed infection. He also advocated Wangenstein suction before operation. The Spanish writer is also impressed favourably by the sulphanilamide insufflation. All four publications advocate simple closure, without big gastric operations, as the best method of treatment.

Prognosis is worse with advancing age, with wintry weather and catarrhal infections, and, of course, when operation has been delayed. Harrison reports that symptoms of peptic ulcer persist in 82.5 per cent of the patients. Few of them, however, had any adequate medical treatment. It does not appear that any of them needed a subsequent operation.

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GASTRITIS.

Sir Henry Tidy, M.D., F.R.C.P.

Gastroscopic Investigations on Gastric Mucosa.—R. Schindler and P. Letendre¹ (Chicago) compare the gastroscopic with the surgical observations in 95 cases of gastric tumour, 91 of which were cancerous. In 5 of the 91 cases of gastric cancer the lesion was not seen gastroscopically and in 5 others the lesion seen was wrongly interpreted. In one case a sarcoma was mistaken for a polyposis, and one benign tumour was called cancer at gastroscopy. In 4 of the 95 cases the gastroscopists did not commit themselves as to the nature of the syndrome.

In 3 cases gastroscopy revealed lesions not palpated or seen by the surgeon on laparotomy. Further examinations proved the lesions to be present. In the series of 91 carcinomata, 16 failures at the first radioscopic examination are compared with 10 failures at the first gastroscopic examination.

S. Wolf and H. G. Wolff² (New York) have had the opportunity of observing the changes to various stimuli of the gastric mucous membrane of a 57-year-old subject with a permanent gastric fistula, 3.5 cm. in diameter, surgically produced in 1895 on account of benign stricture of the œsophagus. The mucosa when congested was especially susceptible to injury, suggesting that vascular engorgement might predispose to the development and persistence of erosion and changes secondary to inflammation. Sustained hyperæmia of the mucous membrane was accompanied by abdominal discomfort and pain. Strong irritants and corrosive agents failed to cause more than a slight or moderate erythema even when sufficiently powerful to cause a reaction with destruction of tissue when applied to the skin. This is thought to indicate that the cells lining the stomach are endowed with some special protection against chemical injury. This special protection is ascribed to a layer of tenacious mucus adherent to the lining of the stomach which increases in response to physical and chemical stimuli. To test this protective power a portion of the mucous membrane was cleaned of this mucus and then the area subjected to 1.0 normal hydrochloric acid. Within two minutes a thick layer of greyish opaque mucus appeared over the area exposed to the acid. Within five minutes the area became moderately reddened and œdematous. On further irritation minute gleaming points became evident and rubbing these with a glass rod caused hæmorrhage and pain. It was further found that if these small hæmorrhagic lesions were kept in contact with gastric juice for half an hour there was a sharp acceleration of gastric secretion with some concomitant hyperæmia of the whole gastric mucous membrane. This may afford an explanation of the persistent hyperacidity present in certain persons suffering from peptic ulcer and gastritis. In a further experiment a small erosion was exposed to the digestive action of gastric juice for four days when it exhibited the typical punched-out appearance of a chronic peptic ulcer with well-defined edges and a granulating base. Pressure on this lesion caused dull pain. During the four days the whole mucosa was relatively engorged and the rate of acid secretion was correlated. The ulcer and surrounding area was then covered with a protective dressing and within 3 days healing was complete.

E. B. Benedict³ (Boston) applies the term hypertrophic gastritis to the presence on gastroscopy of numerous elevations in the gastric mucous membrane, caterpillar-like appearance of the rugæ, and general dullness of the mucosa. In 1300 gastroscopies he diagnosed hypertrophic gastritis without other gastric or duodenal changes in 117. Of this total 60 per cent were in males. The symptoms are described as epigastric pain, vomiting, eructations, heartburn, and nausea. Most of the patients were relieved by a bland diet. In various cases therapeutic measures were tried, including belladonna, alkaline powders, aluminium hydroxide, and hydrochloric acid. None of these measures appeared to have any specific effect. The clinical improvement in most instances was definitely correlated with improvement at gastroscopy. The author is of opinion that only gastroscopy can give a differential diagnosis between the various forms of gastritis, although the radiologists may suggest the general diagnosis with the use of the relief technique.

A. Morton Gill⁴ (London) records the results of gastroscopic examination of 806 Service patients in hospital. In 396 gastritis was found to be present, consisting of superficial gastritis 196, hypertrophic gastritis 166, and atrophic gastritis 34. In 60 cases a gastric lesion was not seen at gastroscopy but was

found by radiography. These consisted of 4 cases of ulcer, 1 of ulcer scar, and 55 of gastritis. The author considers that in the present state of knowledge absence of gastroscopic evidence cannot exclude gastritis, and where a strong clinical case is supported by radiological and other evidence the diagnosis should stand. With regard to gastric ulcers, approximately the same number of ulcers are invisible to X rays as in the case of gastroscopy. Of the total of 34 cases of atrophic gastritis more than half could not be diagnosed as gastritis radiologically and the only other abnormal findings apart from gastroscopy was achlorhydria or well-marked hypochlorhydria on fractional gastric analysis. [The mode of selection of 806 cases submitted to gastroscopy is not recorded, but some selection must have been employed as only 43 cases are recorded as ulcer. The high number of cases of hypertrophic gastritis is contrary to the usual opinion that this type of gastritis is rare.—H. L. T.]

Relationship of Chronic Atrophic Gastritis and Gastric Cancer.—L. W. Guiss and F. W. Stewart⁵ have made a careful study of this subject. They used stomachs which had been obtained within two or three hours of death or within five to ten minutes of surgical resection. The material included 73 specimens of gastric carcinomata, mainly surgically resected, and a large number of controls from persons with no indication of gastric disease or who had died from non-gastric cancer or from various other causes. They found microscopic evidence of chronic atrophic gastritis in 82 per cent of stomachs from apparently normal persons, in 66 per cent of stomachs from persons over 40 years old who died of extra-gastric cancer, in 97 per cent of stomachs with gastric carcinoma, and also a similar incidence in association with gastric diseases other than carcinoma. The authors conclude that chronic atrophic gastritis associated with gastric carcinoma is a non-specific reaction to inflammation and gastric injury in general. They believe that the conception that chronic atrophic gastritis is a pre-cancerous lesion is not borne out by their observations. Both cancer and atrophy in the stomach or elsewhere appear to be events in aging organs.

R. Hebbel⁶ (Minneapolis) arrived at the same conclusions based on similar material. In stomachs from patients who died without manifest gastric disease the incidence of atrophic gastritis bore no demonstrable relationship to any factor other than age. In stomachs resected for ulcer there was gastritis of the antrum in practically every case. Changes in the body were rare in stomachs with duodenal ulcer and common in those with gastric ulcer. The author also believes that gastritis of the antrum precedes and is the basis of chronic gastric ulcer. In 62 stomachs resected for carcinoma the gastric changes were variable: a diffuse atrophic gastritis was present in many and probably preceded the tumours, but in a few the mucous membrane of the body was normal. The author believes that the mucosa changes were secondary to the tumour and that the series did not indicate that carcinomata frequently arise in stomachs in which chronic atrophic gastritis is already present.

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GLANDULAR FEVER (Infectious Mononucleosis).

II. Stanley Banks, M.A., M.D., M.R.C.P., D.P.H.

Aetiology.—An interesting and well-documented paper by Prof. R. A. Webb¹ records the isolation in England by blood culture from a typical case of glandular fever in the 14th day of disease of *Listeria monocytogenes*, a short motile Gram-positive bacillus which grows best aerobically at a temperature of 23° C. This is the third observation of its kind; in the two previous instances the countries of origin were Denmark (A. Nyfeldt, 1929²) and U.S.A. (C. A. Pons and L. A. Julianelle, 1939³). Cultural and biological tests, including the production of

monocytosis and typical lesions of the liver in rabbits, proved the identity of the organism isolated with certain stock strains. *Listeria monocytogenes* is widely distributed in nature, capable of attacking many animal species, chiefly ruminants, and protean in the type of disease which it produces; the latter includes meningo-encephalitis and encephalo-myelitis in sheep and cattle. In man *Listeria meningitis* has occurred with some frequency. In glandular fever, agglutinins in the blood serum of patients at various stages to *Listeria* strains have been found, but only in low and moderate titres, and such agglutinins can also be found in miscellaneous blood samples from the general population. Rabbits injected with the organisms do not give positive Paul-Bunnell tests. These last two observations are against the view that this organism may be the cause of glandular fever. Nevertheless there is a body of evidence in its favour which cannot be ignored and the search for it in blood-cultures and lymph-glands should be vigorously pursued. J. Bang⁴ endeavoured to transmit infectious mononucleosis to 15 volunteers by injection of heparinized blood and other materials from cases of the disease. The results were negative.

Clinical and Pathological Features.—L. Kilham and A. J. Steigman⁵ give an excellent description of the disease in 20 patients. One case had symptoms of encephalitis with a pleocytosis in the spinal fluid. Amongst 25 contacts of two cases, one had a positive Paul-Bunnell test. A liver biopsy done in one deeply jaundiced case showed a well-marked focal acute hepatitis, with a histiocytic reaction in the portal tracts and an excess of monocytes and Kupffer cells in the sinusoids. Such parenchymatous changes in the liver rather than obstruction from enlarged glands in the portal tract might possibly explain the jaundice which occurs in some cases. J. P. A. Halcrow et al.⁶ describe an epidemic in a hospital population in which 125 clinical cases were found and no less than 165 symptom-free patients and staff of the hospital had positive blood-pictures and Paul-Bunnell tests. In addition, control groups of persons living (a) in the neighbourhood of the hospital, (b) in places 13–20 miles distant, and (c) 35 miles distant were tested. A high percentage of (a), low percentage of (b), and none of (c) showed positive blood and serological changes. In this epidemic a large proportion of the population in the neighbourhood of cases appeared to have a latent sub-clinical infection.

Barrett Modification of Paul-Bunnell Test.⁷—In both the above papers reference is made to this new test. Three types of heterophil antibodies which agglutinate sheep red-cells are found in human sera. These are differentiated by an absorption test with ox erythrocytes and guinea-pig kidney. One of these antibodies found in normal sera is not absorbed by either reagent; the type found in human sera after horse serum injection is absorbed by both; and in infectious mononucleosis the diagnostic heterophil antibodies are absorbed by ox red-cells but not by guinea-pig kidney. The Barrett test consists of the Paul-Bunnell test combined with this absorption test. It is useful, particularly where the Paul-Bunnell titre is low. If the Barrett test is positive, a titre of 1:40 in the Paul-Bunnell test is believed to be diagnostic of infectious mononucleosis. It may be necessary to do repeated tests, as a positive result may not be obtained for 3 to 4 weeks from the onset of the disease. T. E. H. Spark⁸ also gives a very full account of the disease, particularly from the diagnostic point of view. He describes 10 cases.

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GLAUCOMA.

Sir Stewart Duke-Elder, M.D., F.R.C.S.

Hereditary glaucoma is not very common, and therefore a family of three generations wherein 7 members were effected and 8 unaffected described by

T. D. Allen and W. G. Ackerman¹ is of interest. They find that hereditary primary glaucoma is a result of a simple dominant type of heredity and is not sex linked. No evidence of consanguinity was present; the average age of onset was 11.6 years; and in all cases the glaucoma was of the chronic simple type. Two of the 4 patients whose error of refraction could be determined had myopia; in 1 this was of more than 5 D. in each eye and in the other there was variable myopia of 1 to 5 D. in the right eye which was difficult to control. The literature contains no evidence of the source of the glaucoma in hereditary cases but the authors found some suggestion of the aetiology. Gonioscopic examinations were carried out on the 4 youngest affected members of this family. In 2, on whom gonioscopy was done before any operation was performed, there were found many fine iris processes with finger-like or web-like projections extending anteriorly toward the limbal portion of the cornea. Although, therefore, there was no suggestion of buphthalmos in any of the cases, the cause was most probably a transmitted anomaly at the angle of the anterior chamber. Treatment of such cases is difficult. Miotics alone are insufficient; the best results are obtained with a combination of both medical and surgical therapy. Early operation, before extensive damage to vision has occurred, is important. In this series of cases goniotomy was effective without repetition in 4 eyes, apparently effective with one repetition in 3 eyes, and ineffective in 1 eye, in which several other operations (five goniotomies, two cyclodialyses, and one basal iridectomy) also were ineffective. Iridencleisis was successful.

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GONORRHOEA.

T. Anwyl-Davies, M.D., F.R.C.P.

Diagnosis.—It is generally believed that blood, ascitic fluid, serum, or similar animal fluids are required by the gonococcus, and such materials have formed the basis for most culture media used for diagnostic purposes. C. E. Lankford, V. Scott, M. E. Cox, and W. R. Cooke¹ suggest that any laboratory using proteose No. 3-haemoglobin agar, or similar autoclave media, should add 1–2 ml. of toluene-preserved liver or yeast extract to each 100 ml. of melted agar just prior to pouring plates. A 12 per cent higher yield of positive cultures, the majority of which were of the 'deficient' variety, was obtained with the medium containing the added extract. No correlation of the deficient-type gonococcus with any particular condition of the patient has been observed.

Standard of Cure.—The use of sulphonamides and the consequent rapid disappearance of symptoms has made it necessary, if possible, to establish a better standard of cure. G. Sewell, P. T. Salchow, and E. A. Nelson² (Detroit) have compared the results obtained with cultures of urine and urethral secretion in the detection of gonococci. They suggest obtaining material for culture by using the first few c.c. of urine passed immediately after prostatic massage. The results so obtained have shown that this method is more reliable than previous ones. Routine cultures were positive in 306 instances in a series of 4182 patients who otherwise would have been discharged as cured upon obtaining 5 negative spreads after prostatic massage and other provocative measures. In a total of 2930 patients, 184 were positive by culture alone, although all were negative by the direct spread. A series of 842 male patients was examined by routine urethral culture and urine cultures. In 827 (98.2 per cent) both the urethral and urine cultures were in agreement and in 15 (1.8 per cent) they did not agree. In 577 patients tested for cure, a greater number of positives was found by means of urine culture than by urethral secretion culture. The urine culture picked up 10 (1.7 per cent) positives among patients under treatment which were missed by urethral secretion cultures. On the other hand, urethral secretion cultures detected 3 (0.5 per cent) which were missed by urine culture.

Thus in treated cases where the results of the two methods disagree, 3·4 times more positives were disclosed by the urine sediment culture. The 577 treated patients had received at least 1 week of treatment with 3 g. sulphathiazole daily.

If gonococci become accustomed to increasing amounts of sulphonamides, certain organisms may appear which have acquired some degree of immunity to the drug. These atypical organisms, which occur in the deeper tissues, are extruded to the surface and there become the source of re-infection. W. R. Jones³ has pointed out the difficulty of the microscopic diagnosis of gonorrhœa which has been altered by sulphonamide therapy. The common findings on spread in the case of an incomplete cure by chemotherapy is a moderate amount of pus, a little mucus, an occasional single intracellular coccus, and one or two pairs of cocci which are usually extracellular. Because of this, organisms found in the discharge of a person who has been exposed to gonorrhœa must be considered specific, until history, clinical or laboratory findings prove otherwise. Treatment should not be instituted until the type of infection is accurately determined. A provocative test should be done, consisting of an injection into the urethra of ordinary bacteriologic nutrient broth, which has a pH of 7·6, or of sterile non-syphilitic hydrocele fluid from a person not recently infected. At present cultures are the most satisfactory guide in the management of gonorrhœa. Jones cites four cases in which gonococci were found only after the most extended search.

Sulphonamide-resistant Strains of Gonococcus.—The phenomenon of pathogenic organisms becoming resistant to the drug employed to annihilate them has been known for many years; during the past two years it has become generally realized that a similar state may arise when bacteria are treated with sulphonamides. W. M. M. Kirby and L. A. Rantz⁴ found that only small concentrations of sulphathiazole can be so resisted. They conclude that the resistance is directed against the chemical group common to all the sulphonamides, namely, the *p*-amino-benzene nucleus. Once maximal resistance has been produced it seems to persist for a very long time. The origin of this resistance is not clear; it may result from the selection of more resistant individuals or from modification of the organisms in the period between their subdivision. Its nature, too, is uncertain; perhaps the resistant organisms have learnt how to manufacture additional quantities of *p*-amino-benzoic acid, which thus neutralizes the sulphonamide inside or outside the cell, but experimental evidence for this explanation is still scanty. Resistant strains certainly occur and cause much damage. If sulphathiazole or sulphadiazine is unsuccessful, it is unlikely that any other sulphonamide will give better results, and in such a case some anti-bacterial agent other than sulphonamides must be used. Organisms with acquired resistance to sulphonamides are not resistant to penicillin, gramicidin, or propamidine.

To establish or disprove a correlation between special strains of the gonococcus and sulphonamide-resistant cases of gonorrhœa, J. Petro⁵ examined gonococci from 44 males with acute gonococcal urethritis. He found that 5 cases clinically resistant to sulphapyridine yielded strains of gonococci which proved resistant or insensitive to a 1–5000 concentration of this drug *in vitro*; a sixth case, illustrating clinical relative resistance was infected by a strain showing only partial sensitivity *in vitro*. Five sulphapyridine-resistant cases also proved resistant to sulphathiazole. Investigation of the female host of one sulphonamide-resistant strain of gonococci supported the view that such a strain can be transmitted from one host to another. Development of resistant strains is probably favoured by inadequate dosage, haphazard tests of cure, and the premature cessation of treatment in defaulters. He discusses five causes of sulphonamide resistance: (1) *Unduly low blood-concentration of free sulphonamide*, although success or failure did not seem to bear any distinct relation to

the blood concentration alone, provided that it was not less than about 3 mg. per 100 c.c.; (2) *Obstruction to transport of sulphonamide to infected tissues*, by cicatricial fibrous tissue around infected foci, and by local vascular failure due to pressure from œdema or venous congestion; (3) *Obstruction to effective drainage of inflammatory pockets* forming a bacterial reservoir harbouring a large mass of organisms and the products of bacterial activity which tend to reverse or overcome the action of sulphonamides; (4) *Weakness of natural defences of the body*; and (5) *Infection with sulphonamide-resistant strains of gonococci*.

Penicillin Treatment.—In 1941 Abraham et al.⁶ noted that the growth of six different strains of gonococci was inhibited in 1–2,000,000 dilution of penicillin, whereas before another strain was inhibited 1–32,000 dilution was required.

W. E. Herrell, E. N. Cook, and L. Thompson⁷ studied the action of penicillin on 5 cases of sulphonamide-resistant gonorrhœa. *In vitro* tests of three strains of gonococci isolated from these patients showed that all these strains were completely inhibited in fairly high dilutions of an active form of penicillin. Bacterial cultures revealed that the number of organisms was greatly decreased at the end of 3 hours' contact with penicillin (1–200,000). The third strain was most resistant, but no viable organisms were found after four hours. The 3 patients from whom the strains had been isolated were treated with penicillin intravenously. Each case received an average of 32,000 Oxford Units during the first twenty-four hours, 24,000 units in the second and third twenty-four hours, and 12,000 units on the fourth day. "The rather striking and early clinical improvement together with the complete lack of any toxic effect was gratifying." The first negative cultures were obtained between 17 and 48 hours after the institution of penicillin therapy. All three cases were considered cured. Later two additional sulphonamide-resistant cases were treated, with similar results. The 24-hour urine of the patients showed that between a third and a half of the penicillin was excreted through the urinary apparatus. Its high degree of solubility permits it to reach the involved tissues readily.

C. S. Keefer et al.⁸ have reported the effect of penicillin on 129 cases of sulphonamide-resistant gonorrhœa treated by J. F. Mahoney and associates. Satisfactory results occurred in 125 cases which became symptomless and bacteriologically negative within 9 to 48 hours after between 100,000 and 160,000 units. The intramuscular or intravenous dosage varied from 10,000 units every 3 hours for 16 doses to 20,000 units every 3 hours for 5 doses, or 25,000 units every 3 hours for 3 doses. They conclude that *penicillin is a most potent weapon and one of the most effective agents in the treatment of gonorrhœa*.

Sulphonamide Treatment.—A sufficiently large series, 453 women and 80 children, suffering from gonococcal infections was treated with each of the sulphonamides by F. L. Adair and L. R. Hac⁹ (Chicago) for them to determine the drug of choice. Sulphathiazole and sulphadiazine are, in the view of these writers, the most successful drugs. Rate of cure with sulphanilamide was 76 per cent, with sulphapyridine 86 per cent, with sulphathiazole 93 per cent, and with sulphadiazine 96 per cent. Drug-fast strains of gonococci are produced rarely in women; only 1 occurred in 453 women.

Sulphapyridine was administered by H. F. Dowling and M. H. Lepper¹⁰ (Washington) to 498 patients, with toxic effects in 29.9 per cent; sulphathiazole administered to 321 patients produced toxic reactions in 11.8 per cent, while sulphadiazine in 600 patients was followed by toxic reactions in 7.7 per cent. The greatest difference in the toxic effects of the three drugs was in the incidence of vomiting, which occurred in 20.5 per cent of those receiving sulphapyridine, and in only 1.4 per cent of those receiving sulphadiazine.

Renal calculi occurred in 1.6 per cent of patients receiving sulphapyridine, 2.8 per cent with sulphathiazole, and 1.5 per cent with sulphadiazine. They

may be prevented by giving sufficiently large amounts of fluids to ensure an adequate renal output, no matter how high the dosages of the drug. A total of 3000 c.c. of fluids per day, or enough fluid to ensure a urinary output of at least 1200 c.c. per day, is recommended. They were able to give sufficient sulphadiazine to keep the blood sulphadiazine level constantly at 20 mg./100 c.c. or above, without evidence of renal calculus formation, by giving large amounts of fluids at the same time. There was no significant difference in the percentage of any of the toxic effects in the two sexes with the exception of vomiting, which occurred more than twice as frequently in females as in males, regardless of the drug used. It was present in 15 per cent of the male patients receiving sulphapyridine and in 33.5 per cent of the females. The corresponding figures for sulphathiazole were 5.2 per cent and 11.3 per cent and for sulphadiazine 1.2 per cent and 3.1 per cent. Of the three drugs, therefore, sulphadiazine, in low doses where possible, but in high doses where necessary, is apparently the most suitable.

The incidence of sulphadiazine crystalluria is higher in acid than in neutral or alkaline urines. D. R. Gilligan, S. Garb and N. Plummer¹¹ found that with alkaline urines (pH 7.5) the solubility of acetylsulphadiazine was over 500 mg./100 c.c., a ten to fifty times greater solubility than in acid buffer solutions. In 147 urines previously rendered alkaline by oral sodium bicarbonate, only 2 specimens showed crystals, and both cleared on further administration of sodium bicarbonate. Therefore sulphadiazine crystalluria can be prevented by the use of this alkali. The dosage needed to maintain the urine at an alkaline level is variable. They advise from 13.7 to 19.5 g. daily in 6 divided doses; this is well tolerated and does not cause alkalosis.

The results of sulphathiazole administered to 488 hospitalized prostitutes culturally positive for the gonococcus was studied by H. Strauss and I. Grunstein¹² (Brooklyn). Only 20 per cent had clinical evidence of the disease. Sulphathiazole was given orally in four doses between 6 a.m. and 10 p.m. The patients were ordered a minimum of 1500 c.c. of fluids daily and to report a diminished urinary output, hæmaturia, or other toxic symptoms. They were divided into three groups. Group 1 received 3 g. daily for 10 days, Group 2 received 4 g. daily for 10 days, and Group 3 received 4 g. daily for 7 days. There was an apparent cure-rate of 90.5 per cent. Additional sulphathiazole or sulphapyridine administered to the failures increased this rate to 98.9 per cent. The criteria of cure must, however, be sufficient to ensure the permanence of apparent cures, for the difficulty in detecting asymptomatic carriers cannot be too strongly emphasized. The writers consider that the infected prostitute, although treated, remains potentially infectious for approximately 3 months, during which she is a source of infection if at large.

A. D. Welch and his colleagues¹³ have extensively studied a new sulphonamide, sulphamerizine (2-sulphanilamido-4-methylpyrimidine), in various animals and in man, comparing it with sulphadiazine on the basis of absorption, excretion, and toxicity. This new agent is more rapidly absorbed than sulphadiazine, produces a high concentration in the blood with a smaller dose than with sulphadiazine, and is more slowly excreted by the kidneys in a form more soluble than sulphadiazine in neutral or acid urine. The preliminary reports of its effect in gonorrhœa are disappointing. In July, 1943, the figures published by the American Neisserian Medical Society and the U.S. Public Health Department¹⁴ showed only 65 per cent of successful results in the fourth week, but severe reactions were low (1.1 per cent).

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GRANULOMA INGUINALE AND LYMPHOGRANULOMA INGUINALE.*Hamilton Bailey, F.R.C.S.*

H. S. Root¹ finds that it is not generally appreciated that granuloma inguinale and lymphogranuloma inguinale are two different diseases. Both are similar in mode of transmission, climate, and racial prevalence. Both manifest a primary genital lesion with secondary involvement of the inguinal, pudendal, and anal regions. With respect to aetiology and fundamental pathology, each constitutes a distinct entity.

Granuloma inguinale has as causative agent a Donovan body. It begins as a macula, becomes papular, and spreads as an ulcerating and sclerosing lesion, travelling by way of the regional lymphatics. Antimony therapy is considered the treatment of choice. Radical excision is often necessary in resistant cases.

Lymphogranuloma inguinale is caused by a filterable virus. The primary lesion is small and transient and heals spontaneously. The secondary phase consists of suppurative lymphadenitis with ulceration and multiple sinus formation. The tertiary phase expresses itself as a chronic granuloma. Anorectal stricture is a common complication in the female. A positive reaction to the Frei test confirms the diagnosis.

From a large experience of cases of granuloma inguinale G. C. Tomskey et al.² have discarded former remedies, including tartar emetic, and rely on the following:—

1. Elimination of secondary infection by cleansing with hydrogen peroxide and hot sitz baths twice daily.
2. The application of 20 per cent podophyllin in olive oil to the lesion after each bath. If pain is experienced, local topical analgesics are applied ten minutes before the podophyllin.
3. When exuberant granulations have disappeared, podophyllin is discontinued and scarlet red ointment substituted. Usually the podophyllin treatment extends from five to seven days.

F. A. R. Stammers³ finds that lymphogranuloma inguinale is common among natives of West Africa. It is almost invariably for the enlargement of the glands of the groin that the patient seeks advice; that is, usually about six weeks after the infection was acquired. Surgical excision is satisfactory in cases undertaken before fistula formation has occurred. Intramuscular injections of anthiomaline, an antimony preparation, 10 to 20 injections, give good results in many cases. Sulphonamide therapy is also valuable.

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HÆMANGIOMATA OF THE SKIN, CONGENITAL. (*See SKIN, CONGENITAL HÆMANGIOMATA OF.*)

HÆMOLYTIC DISEASE OF THE NEWBORN AND ITS TREATMENT.*Clifford White, M.D., F.R.C.P., F.R.C.S., F.R.C.O.G.*

Important additions to our knowledge of the pathology of hæmolytic disease of the newborn (erythroblastosis foetalis) have been made since 1941 when Levine and others worked on the iso-immunization theory of the cause of this condition. This theory may be summarized thus: A man whose blood contains the Rh factor fertilizes a woman whose blood does not contain the Rh factor. If her foetus is Rh-positive, she may produce anti-Rh agglutinins as the result of her immunization by the blood of her foetus. These antibodies pass through the placenta and cause hæmolysis of the fetal red blood-cells. Workers in England and in America have shown that about 15 per cent of a sample of the population taken at random have Rh-negative blood. The Rh factor is inherited

as a dominant Mendelian factor (K. Landsteiner and A. S. Wiener¹), i.e., the Rh-positive child of an Rh-negative mother inherits the factor from the father. If the father is heterozygous (Rhrh) each child will have an even chance of being Rh-negative and so of escaping the disease, but if he is homozygous (RhRh) every child will be Rh-positive and likely to be affected. The variation in the clinical forms which affect the child is probably due to varying degrees and duration of the iso-immunization during the pregnancy. Rarely other causes than the Rh factor may be responsible for the disease.

As a result of the hæmolysis of the foetal red cells there is a great call on the erythropoietic tissues of the foetus, and changes in these tissues are found at post-mortem examination on cases of erythroblastosis and similar diseases of the newborn.

Janet Gimson² collected 19 consecutive cases at Great Ormond Street Hospital in 11 months to February, 1943. She points out that in a children's hospital cases of hydrops foetalis and icterus gravis are not often seen, as they do not survive long enough. Of the 19 cases in her series, 17 were examples of icterus with or without anæmia and 2 were anæmic only without jaundice. The ages varied between 3 and 42 days. Five had a history that previous infants born in the family were born jaundiced and died, or of stillbirths, macerated foetuses, etc. In 4 the history of jaundice in the previous children was vague and 3 were first babies.

All the mothers in Miss Gimson's series were Rh-negative and all the infants Rh-positive. Anti-Rh agglutinins were found in 18 of the 19 mothers. The finding of Rh-negative blood in a mother and Rh-positive blood in her child gives a valuable means of differentiating a severe case of physiological jaundice from mild hæmolytic disease.

The treatment adopted in this series was by transfusion with Rh-negative blood not containing agglutinins, the idea being that the foetal blood is Rh-positive and is undergoing hæmolysis; hence blood given by transfusion, if Rh-positive, will also be destroyed and it is desirable to give blood which will not be hæmolysed in the same way. Blood is provided which will not be destroyed more rapidly than normal and on which the child can live till the hæmolytic process of the disease comes to an end. Research by P. L. Mollison (unpublished) indicates that Rh-negative erythrocytes survive for at least 90 days, whereas Rh-positive erythrocytes are often destroyed within a few days of transfusion.

Clinically transfusion by Rh-positive blood (to cases before 1941) was associated with an increase in the jaundice and swelling of the liver and spleen; also, within a few days, the hæmoglobin and erythrocyte count had fallen and further transfusions—up to 6—were required. Since Rh-negative blood free from agglutinins has been used no increase in the jaundice has been noticed and more than 2 transfusions have not been necessary. All the 18 infants who required transfusion regained and maintained a normal blood-picture. All have been followed up: 16 of the 19 are apparently normal; 1 died of pneumonia, and 2 were presumed to have brain damage and died of bronchopneumonia when about five months old. Previous to the use of Rh-negative blood, of 17 consecutive cases treated by transfusion, 6 died quickly and only 7 finally did well.

(See also BLOOD TRANSFUSION.)

REFERENCES.—¹J. exp. Med. 1941, 74, 309; ²Brit. med. J. 1943, 2, 293.

HÆMOTHORAX, TRAUMATIC.

A. Tudor Edwards, M.Ch., F.R.C.S.

During the 1914–1918 European War, the treatment of hæmothorax was largely allowed to depend upon the size of the effusion of blood. Thus effusions which were sufficient to cause respiratory and/or cardiac embarrassment were aspirated. Similarly, much the same attitude has been adopted in the United

States to civil injuries, caused either by crush injuries or by penetration injuries.

A. Tudor Edwards¹ has reviewed the results of 204 cases of traumatic hæmothorax resulting from the retreat from Dunkirk and the bombing raids in this country. This comprises an attempt to prove that the early (within 48 hours) aspiration of all forms of hæmothorax had considerable advantages, both early and late, over the expectant attitude. The view of most thoracic surgeons in this country is that (1) the blood forms an excellent culture medium for the growth of organisms; (2) it often clots in the pleura at a later stage if not removed; (3) resolution is much delayed; and (4) excessive rigidity and fixation of the chest is by no means uncommon even when infection does not eventuate.

Hæmorrhage and infection are the common causes of death, and as none died from the results of hæmorrhage the most important factor in the group was the incidence of infection.

The cases were divided into two groups: (1) Penetrating injuries; and (2) Non-penetrating injuries. In the former group 125 cases remained uninfected, while 35 became infected; in the latter group 39 cases were uninfected, and 5 became infected. The infection in the latter group is due to spread of infection from the lung or blood-stream, a condition not sufficiently realized.

The effusion of blood is rapidly diluted by serous effusion as a result of irritation of the pleura from the blood. The author is of opinion that the fear of removal of the blood with expansion of the lung and reactionary hæmorrhage has been much exaggerated.

The more extensive hæmothoraces arise from vessels of the chest wall or more rarely from hilar vessels. In the latter group, survival for more than an hour without repeated transfusions of blood is unlikely, and few such will leave the battlefield. In the former, aspiration will not affect the situation. In cases in which the primary hæmorrhage has arisen from lung tissue, the formation of a pulmonary hæmatoma is the cause of the arrest of bleeding, and thus after 24 hours further recrudescence of bleeding is unlikely.

Further analysis of the figures shows that of 24 cases aspirated within 48 hours, only 3 (12.5 per cent) became infected; of 41 cases aspirated between 48 hours and 6 days, 9 (21.9 per cent) became infected; and of 139 aspirated from 6 days onward, 28 (20.1 per cent) became infected.

The risk of hæmothorax becoming infected through aspiration is negligible and is a reflection on the technique rather than the principle. One such case occurred among the series. Aspiration on alternate days should be continued until no further fluid is obtainable and radiological examination fails to disclose either free or encapsulated fluid—this generally requires an average of between 3 and 4 aspirations per patient.

Air replacement is not advocated except a limited quantity after the first aspiration. Retention of small foreign bodies does not appear to increase materially the incidence of pleural infection.

No exact figures were possible in assessing the value of sulphonamides, but in assessing the general principle it is suggested that they play a definite part if given early enough.

Stress is laid on the necessity of repeated aspiration in the earlier formative stages of empyema, to be followed when encapsulation has occurred by rib resection and drainage. Ultimate results were as shown in the table on page 140. The figures in parentheses are the numbers of cases aspirated within 48 hours, and show that there was no residual disability in 91 per cent.

So far as the chest condition was concerned 149 patients were fit to return to, full activity in service or civil life. Those with slight disability included patients

with slight pleural thickening and a minimum of chest rigidity or residual pain sufficient to require re-grading if in the Services. Severe disability is indicated by considerable contraction, pleural thickening, with associated symptoms such as dyspnoea. It entailed discharge from the Services, and in civil life inability to carry on any active occupation.

RESULT	PENETRATING OR PERFORATING		NON-PENETRATING	
	UNINFECTED	INFECTED	UNINFECTED	INFECTED
No disability	109 (18)	15 (2)	25 (2)	—
Slight disability	12	15	14 (1)	3 (1)
Severe disability	2	1	—	—
Chronic empyema	—	3	—	2
Died	—	—	—	—

REFERENCE.—¹*Lancet*, 1943, 1, 97.

HEAD, GUNSHOT WOUNDS OF.

Geoffrey Jefferson, M.S., F.R.C.S.

Major Kenneth Eden,¹ before his untimely death, left to be recorded a most valuable paper on mobile neuro-surgery based on his experiences in the North African campaign. The original paper will be read with great profit; a few of his most important conclusions follow :—

Major Eden believes "that the surgeon who first operates on an open brain wound makes or mars it". Primary union is the aim, the steps being an adequate wound excision with removal of the edges of the bone defect, in-driven bone fragments, and pulped brain. Gentle suction and irrigation is the best method of dealing with the intra-dural portion of the wound, and only in a few cases were any in-driven bone chips left behind. The final closure is a crucial affair, because complete and accurate suture must be obtained without tension. Eden himself used the two-layer stitch of the scalp in common use amongst neuro-surgeons. A bold extension of the wound must be made if the flaps do not come easily together. It is better to do this at the close of the operation rather than to fashion large flaps, which might not be needed, at the beginning. In 92 per cent of 188 soldiers operated on during the first 24 hours primary healing was obtained, but it is interesting to observe that primary healing was obtained in 87 per cent in those operated upon 72 hours after wounding. This is a remarkable testimony to the operator's skill, to the resistance of brain tissue to reasonably virulent infection, and is perhaps an oblique commentary on the type of wound flora which were present in the wounds in this campaign. These points are further emphasized by the fact that primary healing was obtained in three cases out of three operated on from 8 to 10 days after the wound had been received. Major Eden gives an important little table on mortality related to the state of consciousness: out of 15 soldiers who arrived in coma, only 3 survived; of 13 in semi-coma, 6 survived; of 27 who were confused, 23 survived; whereas of 116 who were alert in spite of their brain wounds, often with penetration of the dura, all survived except one. In the light of modern neuro-physiological concepts we would explain these differences in mortality on the grounds of the depth of the wound, on its degree of approximation to the hypothalamus and brain-stem, rather than on the extent of the wound in a cortical or superficial sense. Eden pursued the wise course of leaving the deeply comatose folk on one side for a few hours the better to assess their chances, while he made sure of the simpler cases.

Douglas Miller² has given his experiences on infective complications of battle casualties in the Western Desert campaign. He concludes that the complications of infection are to a large extent avoidable by good primary treatment,

which is applicable much later to head wounds than to wounds elsewhere. The arbitrary limit does not hold, as has been very clearly shown by Kenneth Eden's experiences just given. Miller believes that it is much more important that the man with a head wound should have skilful treatment than that he should have very early treatment; but there are exceptions, for several scalp wounds that had been left open and packed with sulphanilamide powder or vaseline gauze all became infected, healed very slowly, and prolonged the patients' convalescence by weeks, so that a policy of *laissez-faire* does not work. Brain infections are always associated with retained foreign bodies, the most common being in-driven bone fragments. It will be remembered that P. B. Ascroft in his report on the wounds in the Egyptian campaign attributed the very high proportion of brain abscesses that came into his hands to the fact that small in-driven bone fragments were much too often left in the wound; but according to Miller the wounds that he personally saw appeared to have become infected by way of a persistent communication with an improperly treated external wound. Perhaps these two exceptions amount to much the same thing in the long run. Both Eden and Miller found very great advantages in oral or intravenous chemotherapy. Apparently sulphanilamides when packed into an open wound do little good, but this may depend on the presence of a firm and relatively impermeable clot. It cannot be deductively argued that chemotherapeutic agents dusted into a fresh wound are without effect. Miller's paper is very well illustrated. It is interesting for the present writer to observe Miller's re-discovery of the role of ventricular infection from infective cerebritis as a precedent to a fatal meningitis. The present reviewer published at the close of the last war an account of this process. Sulphathiazole has been shown to have the greatest *in vitro* power of inhibiting bacterial growth and should be a potent drug in infected wounds of the brain; it may not be superior to sulphadiazine. Unhappily sulphathiazole causes epileptic attacks which are often rapidly fatal, both in man and in the experimental animal, if it has access to the meningeal spaces. II. Jasper, W. Cone, R. Pudenz, and T. Bennett³ have shown that convulsions may result from intravenous injection of sulphathiazole, but it has to reach an exceptionally high concentration in the blood before this happens (e.g., 84 mg. per cent). Sulphadiazine had no effect on the electrical activity of the monkey's cortex, nor had sulphapyridine and sulphanilamide. These writers believe that a combination of sulphanilamide and sulphadiazine would be the drugs of choice. Sulphapyridine is not epileptogenic or excitatory, but it has a very low solubility and does not approach the antibacterial efficiency of sulphadiazine.

The Russians⁴ have had some trouble from gas infection of the brain, a type which the Allies have not yet encountered to any important degree. They found the best results from active surgical intervention, the use of anti-gas-gangrene serum (5000–10,000 units), with the oral use of sulphanilamide and sulphathiazole intravenously (1 per cent solution, 30–40 c.c., 2 or 3 times in 24 hours). *Cl. perfringens* and *Cl. sporogenes* were the most common anaerobes. In general 61·7 per cent of 300 cases were found to be infected with cocci, 20·5 per cent with putrefactive aerobes, and 11·2 per cent had gas-producing anaerobes. It appears probable that the bacterial flora of both head and other wounds will vary with differences of the terrain in which the battles are fought, and it may be that in future theatres of war infection may be more difficult to control than it proved to be in North Africa.

Penicillin.—The recent report by H. W. Florey and H. Cairns⁵ is still largely confidential, but it is common knowledge that when this drug is available in sufficient quantities it will supersede many at present known, though it is still found wise to mix it with sulpha- drugs. What it amounts to in the main

is that it makes primary closure of war wounds a safer procedure, whilst some which have gone wrong may be quickly put right again. There is no excuse for slipshod surgery in the hope that someone else will put it right with penicillin. Head wounds, being usually of smaller area, need less penicillin by about two-thirds than do large wounds of the extremities with their 50,000 units' requirement.

REFERENCES.—¹*Lancet*, 1943, 2, 689; ²*Aust. N.Z. J. Surg.* 1942, 12, 53; ³*Surg. Gynec. Obstet.* 1943, 76, 599; ⁴*Brit. med. J.* 1943, 1, 785; ⁵*Brit. med. Bull.* 1944, 2, 1.

HEAD INJURIES.

Macdonald Critchley, M.D., F.R.C.P.

A Physician's Conception of Cranial Trauma.—Head injuries form such a banal yet incapacitating problem in Service and industrial medicine that the broadest possible views are those which are most likely to prove revealing. Non-fatal injuries of the head bear one or two features in common; they are often associated with transient disturbance of consciousness; headache is the usual following symptom; prolonged disablement may supervene from a post-concussional syndrome; upon this last there may be engrafted a variety of purely psychogenic symptoms, the assessment of which may be a matter of the very greatest difficulty. Lastly, there is evidence that in many—perhaps most—of the cases which are severe enough to need hospital care, a change in personality may develop, though not necessarily as a permanency. In addition to these habitual neuro-psychiatric manifestations, there may also occur such objective features as wounds of the scalp; sepsis; fracture of the skull; bony defects in the vault; intracranial bleeding. Such features, which may be regarded as complications of a head injury, enter within the province of surgery.

In other words, it is not unreasonable to look upon cases of head injury as essentially neuro-psychiatric problems, dwelling within the realm of such a specialism from first to last; whereas the surgeon is concerned with the complicating features of trauma, and then only in a temporary fashion.

This view is borne out by the important contributions made during the past ten years or so by Professor K. Goldstein^{1, 2}. His studies have revealed the frequency with which central lesions—diffuse or circumscribed—and including of course those due to injury, are followed by subtle changes in the total behaviour of the patient.

Although Goldstein's views are well known to neurologists, it will not be amiss briefly to recapitulate them here. It is pointed out first that the patient may show considerable variability in performance, so that a given task may be carried out well on one occasion and badly on another. Hence, it is not enough simply to record a minus or a plus: one must also notice how the patient behaves during the task. Thus, when faced with a test beyond his capacity, the patient may be observed to show distress, with change in colour, increase in heart-rate, and perhaps irritability or truculence. Goldstein, in this connection, speaks of a "catastrophic situation". Conversely, a patient presented with a task he can manage, looks animated, pleased, interested, and co-operative. The patient unconsciously adjusts his life so as to seek a 'milieu' or environment which makes little or no demands on him likely to bring about a catastrophic situation. Many features which appear at first sight to be part of the essential pathology, are really only the expressions of the sick man's flight from catastrophic situations. There are a number of devices whereby these situations are evaded.

One is by self-exclusion—in extreme cases by loss of consciousness. The individual seeks tranquillity and avoids company. Stimuli impinging upon the patient's milieu are apt to prove distressingly irritating. To avoid them, he builds a protecting fence of ceaseless activity. Or he may assume a cloak of indifference. Another refuge for the patient is a meticulous orderliness: the

utilitarian motive behind this excessive tidiness is an attempt to bring external objects within reach with the very minimum of effort.

It is noteworthy that patients are oblivious to their changed personality after a head injury. This applies, moreover, to cases of impaired motility or speech; field defects; agnostic symptoms—especially when these existing disorders are severe. In other words, the patient has attained a re-adaptation to a shrunken environment.

Modifying somewhat the classical teaching of Hughlings Jackson, Goldstein recognizes that every lesion is followed by two sorts of symptoms: (1) complete loss of performance due to loss of structure (i.e., negative symptoms); and (2) modifications of retained performance. These latter are positive features, which become modified in their nature because no parts of the nervous system function as isolated units.

The principal types of disintegration after lesions of the nervous system can be traced in various ways:—

1. The receptivity of the patient is reduced and delayed. This can be well demonstrated in the visual sphere by means of the tachistoscope.

2. Excitation, once it has passed the threshold, persists for an undue length of time. Such phenomena as perseveration of speech, tonic innervation, prolonged tactile after-sensations, illustrate this point.

3. External factors influence performance unduly. This is shown by the great distractability of the patient—which is not quite the same as saying that he is inattentive. On the contrary, he glides from one concept to another, only until he eventually finds one which is within his capacity. He then clings to this in an exaggerated manner, as a means of protection against a catastrophic situation.

4. Using the terminology of the Gestalt psychologists, there is a blurring of the sharp boundaries between “figure” and “background”. Thus a patient will fail in a performance which requires that single elements be selected from a whole—e.g., he may on demand be able to show his hand, but not a single finger. Or he may appreciate a sensory stimulus but be unable to localize it.

Arising out of this last, is a special difficulty in coping with abstractions—or with adopting a “categorical attitude”, as Goldstein would say. He can think and deal only in terms of the concrete. For example, he may be unable to count aloud, unless he is given a series of objects which he can use as counters.

This is no place to elaborate these interesting and suggestive ideas of Goldstein's; or to discuss their validity and their place in psychopathology. Nor is it worth while to embark upon a critical examination of these teachings, and an enumeration of their shortcomings and possible fallacies. Enough has been said to show that head injuries—in common with other cerebral lesions—form a problem which is far more complex than would appear to the superficial observer; and to indicate the fundamental neuro-psychiatric nature of the brain-injured patient.

REFERENCES.—¹*Psychiat. Quart.* 1936, 10, 586; ²*After-effects of Brain Injuries in War, 1943*, London, Heinemann.

Aubrey Lewis, M.D., F.R.C.P.

Headache is generally assumed to be the commonest complaint after head injury. E. Guttmann¹ has investigated 191 unselected cases admitted to an accident ward after such injury. He found that not more than half of them had a headache at any stage, even though he included very mild and transient headaches. On discharge from hospital only one-fifth of the patients complained of headache. Between discharge from hospital and a follow-up inquiry months later, however, the proportion of people with this symptom increased. Guttmann

concluded that psychological factors are more important in precipitating headache than physical ones in post-contusional cases. Social and psychological factors may greatly influence the patient's attitude towards his headache. The headache of the earlier stage after trauma is commoner when there has been a short post-traumatic amnesia, though this relationship no longer holds true in the later stages.

C. P. Symonds and R. Russell² followed up the survivors out of 242 consecutive cases of acute head injury in Service personnel. They found that a long post-traumatic amnesia implied a bad prognosis for return to duty; 20 per cent of the cases were sooner or later invalidated from the Service. In a larger series of cases of chronic head injury selected for admission because of unsatisfactory progress, the outlook was twice as bad as for the acute cases. This was accounted for by a higher degree of predisposition to mental disorder in the latter group. This conclusion was confirmed by the study of 111 cases of head injury in flying personnel, of whom four times as high a proportion returned to duty as in all the other cases studied; in the original selection of these men their freedom from recognizable predisposition to mental disturbance had played a large part.

M. E. Heppenstall and D. Hill³ examined 150 patients with post-traumatic syndromes and found that half of them had an abnormal electro-encephalogram. This occurred more frequently in patients whose head had been injured before the age of 20. Focal abnormalities occurred in patients with strictly traumatic syndromes; diffuse abnormalities on the other hand were more frequent in patients with depressive, anxiety, schizophrenic, and hysterical syndromes, and in those whose post-traumatic amnesia had been brief or whose personal history contained evidence of psychopathy.

(See also SOCIAL ASPECTS OF PSYCHIATRY.)

REFERENCES.—¹*Lancet*, 1943, 1, 10; ²*Ibid.* 7; ³*Ibid.* 261.

HEADACHE. (See also HEAD INJURIES.) *Geoffrey Jefferson, M.S., F.R.C.S.*

Few subjects are less well understood by general clinicians than headache, a matter always of importance but never more so than now when head injuries are increasing. There is a settled belief that a blow on the head entitles a person to suffer from head pains for an undeterminate length of time, and complaints are treated with an imprecision proportionate to the ignorance of the adviser. As a matter of justice it has to be admitted that it is only during the last 10 years or so that anything very important has been discovered about the mechanisms of pain production in the head. A brief résumé will be given. But for clarity's sake let us first give one or two main conclusions derived from experiment on human beings. These are: (a) that a rise of intracranial pressure does not of itself cause pain; (b) that headache is easily and readily caused by a lowering of intracranial pressure (e.g., the headache that so commonly follows lumbar puncture), produced, we believe, by traction on pain-sensitive structures within the head, mainly vascular.

Two important British papers led the way—Pickering,¹ 1939, and Northfield,² 1938. The first was concerned with the severe headache that follows the injection of fractions of histamine, the second with anatomical and clinical observations made during brain operations and on patients with tumours. From these it became clear: (1) that a disturbance of the blood-supply to the brain, especially an increase in arterial pulsation, was a sure cause of headache; (2) that brain tumours did not always cause headache, and that when they did the pain was related to distortion of the intracranial structures. Northfield thought that headache was a type of visceral pain caused chiefly by changes in tension within the vessels; it is dull, heavy, and diffuse. Dural pain, e.g., produced by a tumour adherent to it, was rarer and resembled somatic pain in

being sharper and more localized (like peritoneal and pleural pain). This concept still remains the most valuable that has been put forward. For some years surgeons had, on selected material, divided the middle meningeal artery or cut or destroyed the upper branches of the trigeminal nerve and cured or relieved unilateral headache. It had been noted that patients in whom the Gasserian ganglion had been excised or its root totally divided did not have headache on that side. More recent research indicates that histamine headache cannot be induced on the denervated side.

Penfield³ (1935) studied the innervation of the dura, and further research has confirmed the fact (already, to be sure, observed) that the chief supply comes from the trigeminal nerve and especially its ophthalmic division. There are twigs also from the 9th, 10th, and 12th cranial nerves, and in the posterior fossa from the upper cervical roots. Later McNaughton⁴ (1939) carried these inquiries further. It appeared that when an intracranial tumour or blood-clot or abscess or brain oedema exerted pressure on the falx or tentorium, pain occurred in areas consistent with the nerve-supply.

A long series of experimental observations have been made by Wolff and Ray⁵ in particular (1934-1943) in America. It is difficult to summarize the conclusions in a few words, but there is to-day less insistence on dural mechanisms, though they remain as possible causes of fixed local pain. The chief facts are these: that the sometimes violent headaches that follow lumbar punctures and histamine injections are associated with a fall in intracranial pressure and are stopped at once if that pressure is raised by the intrathecal injection of normal saline or Ringer's solutions which give extra-mural support to the arteries; that the intracranial pressure can be raised in this way far above normal without pain being produced; that in most cases the pain is of vascular origin and can be reduced or cured by vasoconstrictor drugs (especially the ergot group). The severe headaches that sometimes are experienced in febrile states are akin to histamine headache. It further has emerged that some headaches are extradural, are due to dilatation of the extracranial vessels, e.g., the temporal or occipital. This is so in some cases of migraine and in many of arterial hypertension and arteriosclerosis. It is deduced that the success of ergot in curing many habitual headaches points to an extracerebral causation, because ergot has more effect on the dural and carotid arteries than on the cerebral. Manual pressure on the temporal artery often diminishes migrainous headaches, as the sufferers often discover for themselves, whilst a few cases have been relieved by ligation and excision of these vessels.

The most sensitive structures within the skull, as proved by faradic stimulation at operation, are: (a) the dura, particularly along the course of the meningeal vessels and the tentorium; (b) the great vessels for the short distances that it is technically possible to stimulate them; (c) the venous sinuses at their edges. The innervation of the posterior fossa comes largely from the glossopharyngeal and vagus but equally from the upper cervical branches, hence the posterior occipital and nuchal pain that lesions here so usually cause. Their tendency to cause herniation into the foramen magnum, distorting and fixing the upper cervical cord and its roots, can lead to reflex muscle spasm and certain head postures, mistakenly, in the present writer's view, attributed to upset cerebellar function. Wolff's belief, based on the careful stimulation of many patients under local anaesthesia, is that brain tumours cause headache by traction either exerted locally on vessels or exerted at a distance by displacement of the brain. The headache overlies the tumour in about one-third of the cases.

It emerges from these considerations that post-traumatic headaches are often due to contusion of the scalp and bone and do not necessarily spring from any abnormality within the dura (cf. many migrainous headaches). Further,

that low pressure is a more likely cause than high pressure. The low blood-pressure of the hypotensive convalescent might be a powerful causal factor. It seems at all events that headaches persisting into convalescence after head injuries are most often of vascular origin, and that the practitioner need rarely be afraid that his patient has anything "pressing on his brain". Pneumography has allowed us to verify the fact that in the majority of cases the brain-skull relationships are normal (the relatively rare subdural hematoma excepted), and that pressures are normal or low. There is no doubt that a very high proportion of post-traumatic headaches are neurotic, that they occur especially in people inclined by nature to have headaches, and unless handled with an understanding firmness they lead to degeneration and loss of morale. The medical profession has a considerable responsibility for these happenings because of its uncertain approach to these cases and its tendency to confirm and increase a neurosis, in which the patient's family is only too often an unknowing abettor. There are few patients who have any valid claim to have a headache that prevents them from working within three months after injury. For a very heavy manual worker another month or two may be added, because from such knowledge as we have it seems that violent effort, by increasing pulsation, either in the large vessels at the brain-base or in scalp or skull, might well cause headache. The doctor of the future will learn to distinguish low-pressure from high-pressure headache, the former being much the commoner. His only sure way at the moment is by using his ophthalmoscope.

REFERENCES.—¹*Brit. med. J.* 1939, **1**, 907; ²*Brain*, 1938, **61**, 133; ³*Ass. Res. Nerve Ment. Dis. Proc.* 1935, **15**, 399; ⁴*Ibid.* 1938, **18**, 178; ⁵*Ibid.* 1943, **23**, 173.

HEADACHE AND NASAL CONDITIONS. *F. W. Watkyn-Thomas, F.R.C.S.*

A. W. Proetz,¹ writing on the "practical management of headache", points out that all headache must be due to disturbance transmitted through the cranial nerves, and that it is only restricted areas of the brain and its coverings that are sensitive to pain; such areas are the basal dura, the great venous sinuses, the cerebral arteries at the base, the dural arteries, and arteries outside the cranium. This vascular sensitivity is the physiological basis of one large group of headaches, and plays an important part in the mechanism of other groups.

For convenience Proetz names three groups:—

1. *Headache with definitely demonstrable cause*: (a) Local, e.g., diseases of eyes, nose, teeth, ears, temporo-mandibular joint, neuritis and the neuralgias, brain tumour; (b) Remote, e.g., hypertension, cardiac and renal disease, constipation, anæmias, histamine poisoning, definitely associated allergy, alcohol, drugs, etc., metabolic disturbances.

2. *Causes "semi-demonstrable or suggestive"*: Psychoneurotic disturbances, migraine, fatigue, and occupational influences.

3. *Causes "undemonstrable"*: Under this heading come the 'idiopathic' headaches. They are probably due to vascular changes—acute distension, and, even more, rapid collapse and spasm. They merge into the neuralgic and toxic groups. All these three are closely associated with each other and with arthritis and arteriosclerosis.

In Group 1 the diagnosis is made on the full routine examination, but even then fallacies are possible. Proetz remarks that many people have sinusitis and many have headaches, but even when a patient has sinusitis and headache the headache is not necessarily due to the sinusitis; he holds that less than 5 per cent of all cases of headache are caused by sinus infection. [We may add that we do not even know exactly how sinusitis causes pain; it cannot be by dilatation or pressure alone, for we have all seen mucocoeles painlessly expanding

the bony walls of a sinus.—F. W. W.-T.] The great majority of headaches are due to local vascular disturbances.

On this assumption Proetz tries *alteration of the vascular tone*. If there is no hypertension he gives ephedrine by mouth, with some barbiturate, such as seconal, to diminish the unpleasant effects. Many headaches are immediately relieved by this means; if effective, $\frac{3}{4}$ gr. of ephedrine is given twice daily for a week. Long courses of ephedrine are not advised. If the headache is affected at all—either for better or worse—the cause is probably vascular. If this method fails, and if the patient complains of lassitude, small doses of thyroid with thiamine should be given.

Some cases are relieved by an enema at the beginning of an attack. In others “minor episodes of starvation”, such as overlong intervals between meals, are the cause. As to alcohol, it is not only the amount but the time at which it is taken and form of drink that is important. Smoking again is not entirely a question of quantity; we must consider personal sensitivity and such bad habits as blowing smoke violently through the nose. Faulty posture, sleeping in poorly ventilated rooms, dry and over-heated air must all be considered as possible causes.

Proetz makes the acute comment that “the literature of headache is deeply tinged with the personal experiences of authors”. This is certainly true; it is always easy to find evidence of the particular kind of headache in which one is most interested, or even more from which the investigator suffers himself.

Proetz has not found histamine headaches common, but the condition certainly exists. G. W. Pickering² agrees with Proetz as to the painful sites. He found that immediately after injection of histamine, small vessels dilate, but the intracranial arteries do not fill, probably because intracranial pressure has fallen. Then the arterial and intracranial pressures rise, and the relaxed intracranial arteries are filled and expand. Pickering believes that this expansion causes headache. The headache which sometimes follows lumbar puncture may be explained by widening of the intracranial arteries due to fall of pressure around them or to distortion of the dura in the region of the great sinuses by displacement of the brain following emptying of the subarachnoid space. The resemblance between histamine headache and lumbar puncture headache fails in some points; puncture headache is far more affected by posture and by jugular compression. Typical migraine is relieved by compression of the common carotid on the same side, but is not generally believed to be a true vascular headache, as the state of the scalp arteries and of facial colour and temperature are too variable. [Lauder Brunton, forty years ago, suggested that the pain of migraine was due to spasm of the arteries with dilatation below the spasm. In some cases the temporal does show dilatation over a large part of its course, and then at one spot becomes contracted and impalpable.—F. W. W.-T.] Intravenous injection of ergotamine tartrate gives relief, with a decrease in the temporal pulse but without consistent change in the cerebrospinal-fluid pulse.

Raised intracranial pressure alone cannot be regarded as a constant cause of headache. C. P. Symonds (MEDICAL ANNUAL, 1939, p. 150) describes the condition of “otitic hydrocephalus”. In such a case there may be severe papilloedema and a cerebrospinal fluid pressure of over 200 mm. with trivial headache. Pickering agrees that raised pressure is not the only factor. In traumatic headache he adduces evidence to show that the pain is due to stretching of adhesions around the meningeal vessels.

B. T. Horton, A. R. Maclean, and W. McK. Craig³ record 84 patients, aged between thirty and fifty, who had vascular headache with vasodilatation. There was no family or hereditary history. Pain was unilateral, constant, severe, burning or boring, involving eye, temple, face, and neck. There was

no trigger zone and the branches of the external carotid were often tender to pressure. Attacks started and ended suddenly, and varied in duration from 15 minutes to several hours. Attacks usually occurred at night. They were accompanied by flushing of the affected side, nasal blocking, and running from eyes and nose. Pain was made worse by lying down, and was sometimes relieved by pressure on the common carotid. Doses of 0.3 mg. histamine would produce the attack, and permanent relief was obtained in 68 out of 84 patients by a course of histamine immunization.

T. R. Gittens⁴ believes that sphenopalatine and vidian neuralgias may exist, but in ordinary practice they are "almost mythical conditions" except when they represent transient vasomotor disturbances or a tender mandibular joint due to poor dental occlusion. He has seen the "vacuum sinusitis" but does not believe it is the cause of the symptom complex. Pressure pain due to a deflected septum or masses of polypi has often been discussed, but many patients with badly obstructed noses have no headache. Most patients who complain of sinus headache really suffer from transient vasomotor disturbance in the brain substance or the meninges. Such patients get relief from nasal astringents because of the intimate relation between the blood-supply of the nose and the cranial cavities. Patients with migraine or other form of vasomotor pain should have nasal obstructions removed only when there is good reason for doing so apart from the vasomotor or allergic signs and not because of them. S. J. Crowe⁵ gives a table of the differential signs between migraine and vascular headache:—

	MIGRAINE	VASCULAR HEADACHE
Heredity	Yes	No
Prodromal symptoms	Yes	No
Visual disturbance	Yes	No
Periodicity	Yes	No
Nausea and vomiting	Yes	No
Vasodilatation—eye injected, lacrimation, nasal block- age, unilateral sweating	Yes	Yes
Colour of face in attack	Pale	Red
Duration of pain	12 hours	A few minutes to a few hours
Number of attacks	Never more than one a day	May have as many as ten a day
Onset and cessation	Gradual	Sudden
Posture during attack	Prefers to lie flat	Much worse lying flat
Effect of alcohol	No effect	Makes pain much worse
Sex	More common in female	Rarely occurs in female
Other symptoms	None	Vertigo, tinnitus, vasodila- tion of hand or foot, polyuria

This table must not be taken too literally; there are cases which seem intermediate between the two main groups. Polyuria is not uncommon in true migraine, and the evidence of vasodilatation in migraine is seldom so strong as is here suggested.

Horton in a later paper⁶ amplifies his earlier work, and describes a definite "histaminic cephalalgia" for which he believes that histamine is as specific as insulin for diabetes. He treats the condition by histamine immunization, as he suggested before, and confirms his results. Further confirmation is given by B. M. Baker.⁷

E. M. Seydell⁸ describes "myalgic headache" caused by non-inflammatory processes in the cervical muscles. It is more frequent in adult life and is often associated with vasomotor instability, allergy, arthritis, and various endocrine or metabolic troubles. Occupation and posture are important factors. These patients are sensitive to cold, and exposure is often the immediate cause of an attack. The localization, nature, and degree of pain is variable. Diagnosis is made by systematic examination of the neck muscles for painful nodules or for spasm. Heat and massage are the most effective methods of treatment.

These papers mark a considerable advance in the treatment of headache. Undoubtedly, as Proetz points out, we are much too apt to be biased by our personal experiences, either as surgeons or, it may be added, as sufferers. The greatest danger in the past has been too zealous surgery. This is specially true of the surgery of the posterior sinuses. With better methods of diagnosis we can now say that it is exceedingly rare to find suppuration of the sphenoid and posterior ethmoid without advanced suppuration in the antrum and usually in the mid-ethmoid as well. For this reason the ingenious operations described by Greenfield Sluder twenty years ago are almost obsolete. Neuralgia of the sphenopalatine ganglion (MEDICAL ANNUAL, 1938, p. 353) may occur, but, as Gittens has remarked, it is "almost mythical". Vacuum headache certainly does occur, but it is very uncommon and should be relieved by displacement. The question of submucous resection of the septum for the relief of headache often arises. In a small group of cases headache seems definitely due to the mechanical pressure of a septal deformity on the middle turbinal. These cases are few, and the diagnosis is made by the immediate relief given by cocaineization of the affected area. As a good general rule a submucous resection in a case of headache should only be done when the operation would be advisable, either for obstruction of the airway or for interference with the drainage of the middle meatus, without any consideration for the headaches. With accessory sinus suppuration much the same rule applies, but if a chronic sinusitis is not relieved by treatment and no other obvious cause of headache can be found, we are entitled to say that, although drainage of the sinus will not necessarily end the headaches, it is unlikely that the headaches will be amenable to treatment until the sinus has been drained. It must always be remembered that because a patient has a sinusitis that justifies surgical intervention it does not exclude the possibility that he has also glaucoma or advanced arteriosclerosis.

On the whole surgery should be the last resort in cases of headache where a nasal origin is suspected, but it is not a reason for refraining from surgery where the usual indications are present.

Headache associated with chronic aural suppuration is, except in the clearly harmless conditions such as mucoid discharge through an anterior perforation, always an indication for surgical intervention.

REFERENCES.—¹*Ann. Otol., etc.* 1943, **52**, 409; ²*Brit. med. J.* 1939, **1**, 907; ³*Proc. Mayo Clin.* 1939, **14**, 257; ⁴*Arch. oto-laryngol.* 1939, **30**, 569; ⁵*Year Book of Throat, Nose and Ear*, 1940, 533; ⁶*J. Amer. med. Ass.* 1941, **116**, 377; ⁷*Trans. Ass. Amer. Phys.* 1940, **55**, 294; ⁸*Arch. oto-laryngol.* 1940, **32**, 860.

HEART. (See also ARRHYTHMIA; CARDIAC; ENDOCARDITIS.)

HEART FAILURE.

William Evans, M.D., F.R.C.P.

Treatment.—The effect of digitalis, strophanthin, theophylline, and analeptics on the cardiac output has been tested by S. Berseus.¹ Digitalis administered intravenously in cases of heart failure caused an immediate increase in the cardiac output; the increase was maximal after 1½ hours and was still present 2½ hours later. In normal subjects no significant changes occurred. Strophanthin had a similar effect which appeared more quickly and was of a shorter duration. Theophylline produced no significant effect. Metrazol and nikethamide in cases of heart failure had no influence either on the circulation or on the respiration in the usual therapeutic doses.

REFERENCE.—¹*Acta med. scand.* 1943, Supplement 145.

HEAT EXHAUSTION IN THE TROPICS. (See SUNSTROKE AND HEAT EXHAUSTION IN THE TROPICS.)

HEPATIC ABSCESS, AMŒBIC. (*See AMŒBIASIS.*)**HEPATITIS, INFECTIVE.***Col. William S. Middleton, M.C.*

A mounting interest in hepatic disorders is reflected in the extensive literature of recent years. Infective hepatitis has been a recurring problem in military as well as civilian medicine and there is growing evidence of a recent increase in its incidence. The alarming experience in the occurrence of 28,585 instances of post-vaccinal jaundice (yellow fever) with 62 deaths in the United States' Army in the first six months of 1942¹ particularly focused American attention on the subject. Homologous sera have been incriminated by other recent experiences, and arsphenamine jaundice enters the field with a divergence of opinion as to its mechanism. The term 'infective hepatitis' has been contested by Ottenberg and Spiegel² on grounds that would not appear tenable. They maintain that the nomenclature 'epidemic' and 'infective' jaundice is equivocal since spirochetal jaundice and yellow fever fall into this group. Their preferred term, simple jaundice, places undue weight upon a single objective symptom. The designation 'infective hepatitis' fulfils the connotations of presumptive aetiology and pathology. Until such time as the actual infective agent is isolated, it should remain the accepted denomination.

Epidemiology.—The epidemic occurrence of infective hepatitis is not a new observation, but in the past year particular attention has been paid to the subject. Evans³ reports an interesting study of an institutional epidemic of 65 cases of hepatitis. Thirty-five days' interval obtained between its occurrence in the first and second nurses. In the next seven months 4 nurses acquired the disease, to be followed by 5 children and 5 more nurses from the same ward, together with 2 nurses and a ward maid in the nurses' sick-room. The curve of incidence subsided; but in seventeen months the further appearance of 8 instances of hepatitis among children and 30 among the nurses completed the picture of unusual significance. Evans finds that babies are almost immune and children are less seriously affected than adults. He places the infectivity of hepatitis midway between the more and the less infectious diseases. Direct contact, probably aerial, is deemed the mechanism of transmission. Edwards⁴ describes an outbreak of 64 instances of hepatitis, chiefly among school children with a few adults, usually young school teachers, in eight months. Rural dwellers are more affected than urban in his experience. Garcia⁵ finds epidemic hepatitis particularly prevalent in children between 3 and 13 years old in peace-time, whereas during war the adult population is more affected. Ford⁶ recounts an epidemic of 300 instances of the disease at Wembley. In this group one died of yellow atrophy. There appeared no common source of infection in water, milk, or food-supply. No suspicion was attributed to a rat vector. Immediate contact was deemed the most probable mechanism of transmission. Cameron's observations⁷ in Palestine are particularly significant. Among military personnel in 1940 there occurred 342 instances of the disease independent of spirochætal jaundice, which is endemic in that area. From January to April, 1941, inclusive, 126 patients with the same disease were reported. As in other reports, a high incidence among hospital attendants was noted. New arrivals in Palestine have an increased susceptibility to hepatitis. One attack apparently confers an immunity; hence the low rate in the adult native population. Droplet infection, contamination by dust, and spread by insect vectors (horse-fly and bed-bug) were given due consideration without arriving at a satisfactory conclusion. The suspicion of a causal relation in contact with horses led to studies for piropiasmosis which proved negative.

Relation to Other Forms of Jaundice.—The complex question of infective hepatitis has been further involved by the jaundice attendant upon the use of

homologous sera and arsphenamine. Circular Letter No. 95 of the Surgeon General, United States Army,⁸ carefully analyses the epidemic which reached its peak in the week of June 20, 1942, and indicates the responsibility of certain lots of yellow fever vaccine for the same. The mortality-rate of 0.2 per cent is probably exaggerated by the fact that only the more seriously ill soldiers would report sick. The chief hepatic lesions were "acute or subacute yellow or red atrophy". This experience with yellow fever vaccine is not new, and as in previous instances the vaccine itself has been vindicated and the responsibility for the hepatotoxic action has been placed upon the human serum diluent.

The memorandum of the Ministry of Health, January 16, 1943,⁹ affords a comprehensive survey of other forms of homologous serum jaundice. In March, 1942, 266 British soldiers received mumps convalescent serum; of these 86 became jaundiced. In another relation, of 109 recipients of measles convalescent serum 37 developed icterus and 8 died in 61-93 days. The gravity of this condition as compared with the benignity of the hepatitis from mumps convalescent serum is noteworthy. The pathological findings at necropsy included subacute atrophy, fatty degeneration and gross necrosis of the liver, fatty degeneration and necrosis of the kidneys, and hæmorrhages into the stomach, brain, and other viscera. Detailed investigations were directed toward the suspected measles convalescent serum without profit, and re-survey of the donors afforded no clue. Morgan and Williamson¹⁰ traced the subsequent course of 50 patients receiving local pooled plasma or reconstituted dried serum. Of these, 9 developed jaundice. They support the theory of a hepatotoxic substance but are equivocal as to the manner of its action. Oversight of such occurrences, in their opinion, arises from the long symptomless period following the introduction of the pathogenic agent. A total of 12 instances of hepatitis from reconstituted dried serum has occurred in E.M.S. hospitals. Beeson¹¹ collected 7 patients with hepatitis following transfusion of blood or plasma from the Grady Hospital (Atlanta) files. An incubation period of 1-4 months obtained. In 6 of the 7 patients the diagnosis of acute catarrhal jaundice had been made, while the seventh was termed toxic hepatitis. He cites the necessity for team-work in the recognition of a condition so long overlooked by reason of its long incubation period.

Arsphenamine hepatitis is a growing problem with many implications. Anwyl-Davies¹² surveyed the experience of St. Thomas's Hospital in post-arsphenamine jaundice. He cites the direct toxic action of arsenic upon the liver and the influence of such factors as alcohol, diet, and concurrent diseases, but does not feel that these explain the increased incidence of jaundice among syphilitic patients receiving arsenic. By careful technique the criticism of the introduction of a virus by direct intravenous inoculation has been ruled out at St. Thomas's Hospital. Activation of a virus latent in the body by the arsenical receives little practical support. In his judgment, the sharp increase in the incidence of jaundice upon introduction of arsenicals for the treatment of syphilis would place the responsibility upon the therapeutic agent itself. Mapharside (12.33 per cent developing jaundice) has proved much less of an offender than neoarsphenamine (28.9 per cent). In the discussion of this paper Dudley¹³ is even more emphatic:

"Practically, I do not see that this [activation of a virus] matters much, for if this theory is true it only means that mapharside is a less effective activator of the virus than N.A.B., and, other things being equal, mapharside is the drug to use." The true aetiology of post-arsphenamine jaundice remains in doubt, but the comparison of the incidence of jaundice between syphilitics and non-syphilitics and between syphilitics receiving different forms of therapy would indicate the existence of a variable besides the basic disease and the drug.

Aetiology.—The aetiology of infective hepatitis has not been fixed. With Professor I. J. Kligler and Captain D. G. Colville, Cameron⁷ report negative results in extensive animal experimentation. By every conceivable route a variety of animals was exposed to the introduction of blood, plasma, leucocytic fractions, and nasal washings from patients with infective hepatitis. Extending this study (with Captain Colville) Cameron injected 7 human volunteers intramuscularly with 1–2 c.c. of ‘infected’ whole blood or plasma. The fatal issue of the natural course of infective hepatitis in several patients in the area led to an interruption of the plan to study other routes of transmission. However, all of these volunteers (6 of the 7) who could be followed, developed jaundice at intervals ranging from 1 to 6 months. Some reservation of continued exposures is expressed by the authors, since none of these volunteers was relieved from routine duties; but, in effect, the results confirm Voegt’s observations¹⁴ of the transmissibility of infective hepatitis. Van Rooyen and Gordon¹⁵ report extensive experimental efforts to reproduce infective hepatitis with negative results. Ciede and Luz¹⁶ claim the cultivation of a virus from the duodenal fluid of patients with ‘hepatitis epidemica’ on developing hen’s egg.

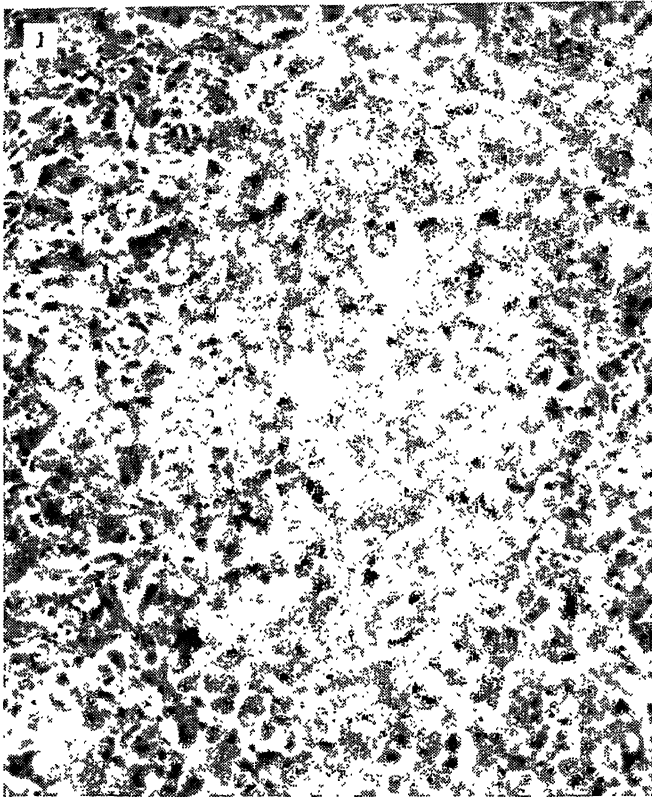
Pathology.—Significant advances in the knowledge of the pathology of infective hepatitis have been made in recent years. The role of an independent cholangitis, whether hematogenous or from ascending infection with obstruction, has been minimized by recent developments. Isolated biopsy reports of the liver in this condition include Cameron’s description of early degeneration with swelling and diminished intensity of staining of the cells at the centre of the lobule, increased cellularity (lymphocytes and monocytes) of the portal tracts, and hyperplasia of the reticulin fibrils. In 1939 Roholm and Iverson¹⁷ proposed aspiration biopsies of the liver. A 2-mm.-bore cannula is introduced into the right ninth intercostal space in the mid-axillary line and the liver pierced by the transpleural route. Satisfactory hepatic samples (2 × 20 mm.) for histologic study are thus obtained. Dible, McMichael, and Sherlock¹⁸ have exploited this technique. They point out the restricted field of exploration by this approach; but by correlation with hepatic changes established at necropsy they feel that specimens obtained by punch biopsy are representative. The procedure is not devoid of the danger of hæmorrhage. Dible and his associates report this complication in 3 of 126 punctures. Two of these patients responded to transfusion; a third died and acute necrosis of the liver was disclosed at necropsy. A fourth subject, moribund from subacute liver necrosis, general paralysis of the insane, and rectal carcinoma, showed signs of hæmorrhage 48 hours after hepatic puncture, and succumbed. Clearly, punch biopsy of the liver is not without risk. Its proper place should remain in expert hands for research purposes for the time being, although better selection and preparation of the subjects by vitamin K and transfusions may reduce the obvious hazards.

The earlier studies of biopsies of the liver by the Scandinavian workers indicated general disarrangement of the parenchymal cells of the liver with necrobiotic changes, infiltration with mononuclear cells, and increased connective tissue in the portal spaces, around the central vein, and in the lobule. These observations have been materially extended by Dible, McMichael, and Sherlock. On the basis of a considerable experience (56 patients) they segment the histologic changes of acute hepatitis into three forms, i.e., diffuse, zonal, and mixed, with an added repair phase. In general, necrosis and autolysis of the hepatic parenchyma is associated with a leucocytic and histiocytic reaction. The degenerative changes prevail at the centres of the lobules, while cellular infiltration is more marked in the portal tracts. Although no sharp line of demarcation may be drawn, the patients exhibiting the milder clinical courses have shown a preponderance of periportal cellular infiltration (zonal type), whereas the more

PLATE XII

PATHOLOGY OF INFECTIVE HEPATITIS

(J. H. DIBLE, J. McMICHAEL, AND S. P. V. SHERLOCK)



Plates XII-XV by kind permission of 'The Lancet'

PLATE XIII

PATHOLOGY OF INFECTIVE HEPATITIS—*continued*

(J. H. DIBLE, J. McMICHAEL, AND S. P. V. SHERLOCK)

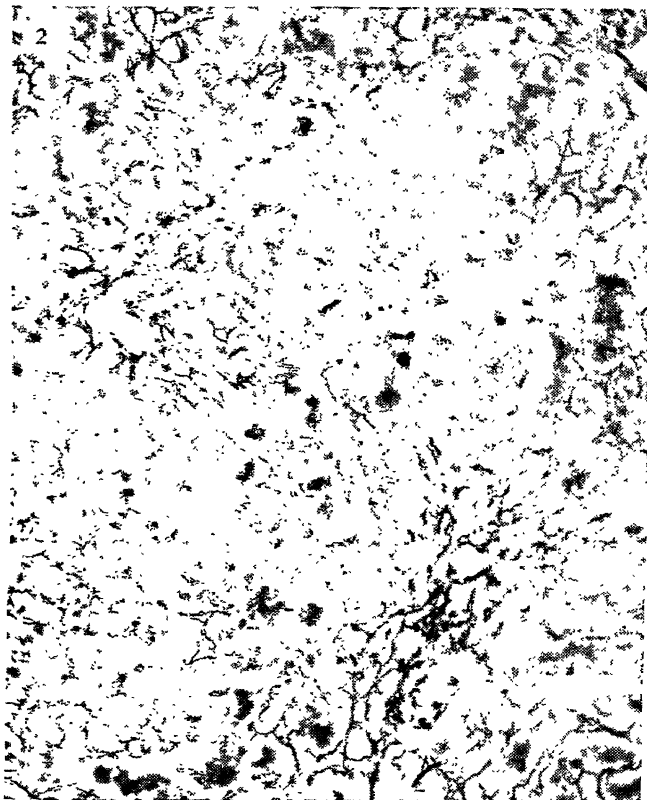


PLATE XIV

PATHOLOGY OF INFECTIVE HEPATITIS—*continued*

(J. H. DIBLE, J. McMICHAEL, AND S. P. V. SHERLOCK)

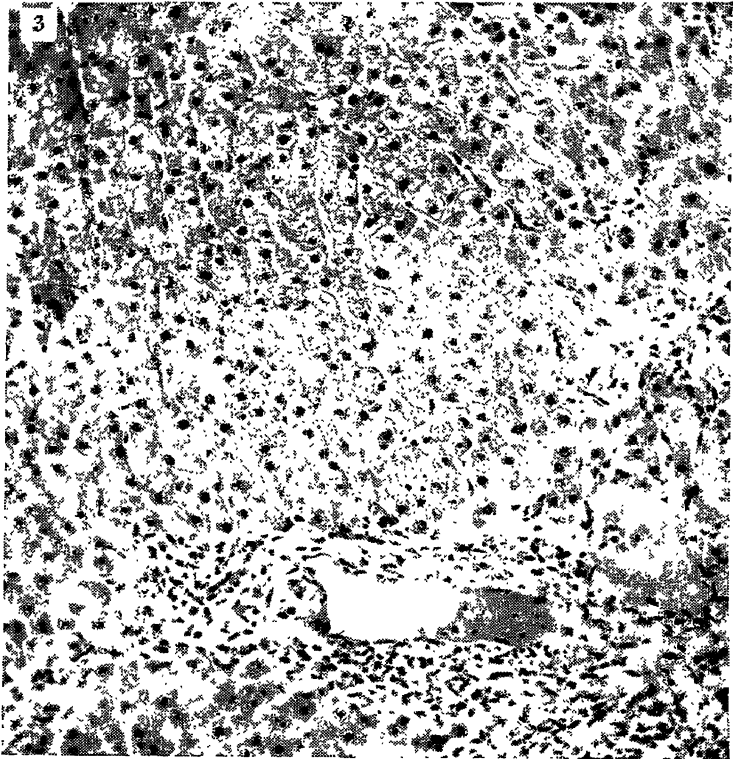


PLATE XV

PATHOLOGY OF INFECTIVE HEPATITIS—*continued*

(J. H. DIBLE, J. McMICHAEL, AND S. P. V. SHERLOCK)



serious courses have been attended by more pronounced degeneration of the hepatic cells with widespread leucocytic and histiocytic infiltration (diffuse type). The mixed type may represent a transition between these basic forms or a resolving diffuse process.

A clinico-pathological correlation is indicated in the following table, reproduced from *The Lancet* :—

FREQUENCY WITH WHICH THE DIFFERENT PATHOLOGICAL LESIONS WERE FOUND IN RELATION TO DURATION OF DISEASE AND INTENSITY OF THE JAUNDICE

TYPE OF LESION	DURATION IN WEEKS			SERUM BILIRUBIN (mg. per 100 cc.)
	Under 1	1-2	Over 2	
Diffuse	12	2	1	3-17.2 (mean 8.0)
Mixed diffuse and zonal	7	4	3	2.6-14.6 (mean 8.0)
Zonal	9	3	9	Under 1 wk., 2.5-6.3 (mean 4.7)
Residual fibrosis	—	—	6*	Over 2 wk., 1.1-9.2 (mean 3.3)

* Duration 7-26 weeks ; only 2 slightly jaundiced.

It is significant that diffuse lesions are unusual after the second week. Resolution of the diffuse form may well account for the projected picture of mixed or zonal changes in the later stages. As might be anticipated, residual fibrosis did not appear until after 2 weeks.

Illustrations from the original article are reproduced through the courtesy of the authors and publishers. *Plates XII, XIII, and XIV* are photomicrographs of the sections of the liver from the same patient, suffering from epidemic hepatitis. *Plate XII*, taken on the 19th day of the jaundice, shows a complete loss of the normal hepatic columns, degeneration of the parenchymatous cells, and inflammatory cellular reaction. *Plate XIII*, taken from the same specimen, shows a remarkable preservation of reticulin in spite of the severe injury of the hepatic parenchyma. *Plate XIV* depicts the status of the same liver 5 weeks later. The lobular architecture has been surprisingly restored, and increased cellularity of the portal tracts is the sole histological remnant of the hepatic injury.

Through the clinico-pathological correlation it became apparent that histologic changes in the liver begin with the prodromal gastro-intestinal symptoms. Within a week patients with mild clinical courses show cellular changes in the portal zone, with little disintegration of the lobule. Acute severe courses are attendant upon diffuse or mixed lesions with distortion of the lobular architecture, degeneration of the hepatic cells, and histiocytic and leucocytic infiltration of the lobule. Degeneration and autolysis are usually most severe about the hepatic vein. Infiltration of the neutrophils and histiocytes extends from the portal vein centrally. Significantly, in the face of severe degenerative changes and complete disintegration of normal hepatic architecture reticulin is preserved. On this scaffolding, regeneration may occur. In other instances there may be progression to acute or subacute liver necrosis. Cirrhosis of the liver may eventuate from fibrous tissue proliferation. Two such instances were observed : one in arsphenamine hepatitis ; the other in epidemic hepatitis occurring in an elderly woman. Nodular hyperplasia of the liver parenchyma, fibrous tissue bands, and overgrowth of the biliary ducts were remarked (*Plate XV*). In 9 instances mild residual fibrosis with little periportal scarring was noted 21 to 51 days from the onset of the jaundice. These patients recovered.

From these studies invaluable information relative to the pathogenesis and pathology of infective hepatitis has been gained. No histological distinction could be made among epidemic hepatitis, arsphenamine hepatitis, and homologous

serum jaundice. Recently Dible and McMichael¹⁹ studied sections of the liver from 35 patients with arsenical jaundice. The histology and pathological sequence coincide with all like features of epidemic hepatitis and homologous serum jaundice. They reject an independent role for either syphilis or arsenic, but incriminate "an agent similar to that causing serum jaundice or epidemic hepatitis". In general, the severity of the hepatic lesion exceeds the prediction from clinical criteria. The remarkable recuperability of the liver is emphasized by these studies. Twelve of the 56 patients¹⁸ with acute hepatitis showed histological injury to over 50 per cent of the hepatic parenchyma. Yet all of the 12 proceeded to almost complete convalescence. These observations confirm the report of the Surgeon General⁸ relative to post-vaccinal hepatitis. "It is evident that the destructive process and the removal of debris by lysis is rapid. Within ten days the bulk of the necrotic material has usually been removed completely. The stroma is rarely damaged to any extent; in many areas the lobular framework remains intact."

Cause of the Jaundice.—The nature of the symptom jaundice has received some recent notice. Van Rooyen and Gordon¹⁵ establish no indication of gastric, duodenal, or biliary catarrh from the studies of gastric and duodenal contents from 11 patients with infective hepatitis. From this indirect evidence they conclude that the jaundice of this condition "appears to be due to a toxic process affecting primarily the liver parenchymal cell, resulting in reduction of biliary secretion". Dible, McMichael, and Sherlock¹⁸ suggest interruption of the intercellular bile canaliculi, isolation and injury of the hepatic parenchymatous cells, as cogent reasons for jaundice. Certainly their studies exclude an intra-hepatic catarrhal obstruction in the interlobular bile-ducts.

Symptomatology and Diagnosis.—Little has been added to the knowledge of the clinical picture of infective hepatitis.^{3, 4, 5, 6, 7} Certain points have been stressed in the interest of differential diagnoses. Distaste for food and smoking may be early prodromata. Malaise, fever, and headache are moderate. Nausea is common but vomiting unusual. Pre-icteric pruritus is less common than in obstructive jaundice. Abdominal discomfort may give way to actual pain in the right upper quadrant, epigastrium, or diffusely distributed. Physical fatigue, mental depression, and drowsiness vary in degree. With the appearance of jaundice in 3-6 days after the onset the constitutional symptoms usually disappear quite regularly. The occurrence of infective hepatitis without jaundice is increasingly recognized, particularly in epidemic periods.^{3, 5, 6, 7} Constipation is the rule. Skin eruptions of varying orders have been described. These include erythema, macules, papules, urticaria, and petechiae. Icterus appears first in the sclerae but soon pigments the buccal mucous membranes, the skin, and the secretions. Latent jaundice may sometimes be revealed by the injection of 0.10 mg. of histamine hydrochloride intracutaneously (Klein test). Or a similar result may be obtained by substituting normal saline. The wheal produced by such solutions is compressed by a glass slide and the yellow pigmentation of the skin is thereby accentuated. The urine is highly coloured in most instances and the stools acholic in 50 per cent of the patients. Bradycardia is characteristic, and it tends to disappear with the improvement of the jaundice. Pre-icteric tachycardia has been observed. The liver is enlarged, two or three fingers' breadth below the costal margin in the majority of instances. Its greatest enlargement appears in the second week. Tenderness and roundness of the edge of the liver are observed in many of these patients. The spleen is palpable in 75 per cent. Cameron and Colville⁷ emphasize 5 points of diagnostic importance: (1) anorexia, (2) abdominal discomfort with or without hepatic enlargement and tenderness, (3) absence of leucocytosis, (4) increased urobilinogen in the urine, and (5) histamine wheal test for latent jaundice.

The *laboratory aids* have not been greatly extended through recent studies. Leucopenia with relative lymphocytosis and absolute monocytosis has long been recognized as the characteristic blood formula of early infective hepatitis (Thewlis and Middleton²⁰). Cameron⁷ confirms these details, except for an inconstancy of the last named. Fat analyses of the stool by the same worker have given the following figures: total fat of dried stool 46.7 per cent; free fatty acid 30.0 per cent; combined fatty acid 16.7 per cent. The growing experience with hepatic functional tests has not afforded the anticipated support. Obviously, the manifold functions of the liver and the wide margin of safety explain certain of the difficulties. Urobilinogen and bilirubin in the urine, icterus index, qualitative and quantitative van den Bergh determinations of the bilirubin of the blood, bromsulphalein, galactose tolerance, and hippuric acid synthesis determinations have been widely applied. The cephalin-cholesterol flocculation test has not proved generally applicable. The serum protein partition (albumin/globulin ratio) is an important guide to serious liver damage. Prothrombin levels of the blood and fibrinogen determinations likewise have a place in the detailed studies of liver function.

The memorandum of the Ministry of Health⁹ gives *incubation periods* of 16 weeks to 161 days for jaundice following the injection of measles convalescent serum, and 60 to 90 days for that succeeding mumps convalescent serum. Ottenberg and Spiegel² find the incubation period for post-vaccinal (yellow fever) hepatitis to be 6 weeks to 6 months, with a majority 10 to 15 weeks. The long incubation period, the absence of constitutional symptoms in a high percentage of patients, the higher incidence of arthralgia and skin eruptions, and the absence of secondary instances of jaundice among contacts with post-vaccinal hepatitis have led many students of the subject to differentiate this condition from infective hepatitis (incubation, 3 to 5 weeks).

There are many hiatuses in the knowledge of the natural course of this disease. The aetiological agent has not been isolated. Findlay and Martin²¹ in carefully controlled studies report the transmission of post-vaccinal hepatitis to 3 of 4 human volunteers by naso-pharyngeal washings. The incubation periods were 28, 30, and 50 days respectively. The hepatotoxic agent introduced in such small quantities as represented by the serum diluent of the yellow fever vaccine must undergo a phase of multiplication before becoming pathogenic. The relatively heavy dosage of the inoculum represented in other sources of homologous serum hepatitis, as blood transfusion, reconstituted dried plasma, and convalescent serum, may explain the shorter incubation period and afford clinical differences in these forms. Finally, the ordinary portal for infective hepatitis is obviously different from the parenteral route incriminated in the analogous conditions. This circumstance may explain certain of the apparent divergences. For the present no cogent reason for the separate consideration of infective hepatitis and homologous serum jaundice can be found. Arsphenamine jaundice may represent a different situation. A heavy metal with a predilection for the liver may be independently responsible for the toxic reaction, or a latent infectious process may be activated by the increased susceptibility of the liver parenchyma to injury through the mediation of arsenic. Allergy does not appear to play a primary part in the condition.

Prophylaxis.—From accumulated experience infective hepatitis should be treated as a communicable disease. Ford⁶ advised the exclusion from school of students who vomit. The period of infectivity is not clearly defined. The dangers of homologous sera should dictate the necessity for the careful history-taking of donors and the exclusion of all individuals with a history of jaundice within a year. In unusual emergencies expediency may require a differentiation of the type of jaundice and the utilization of blood products, where the infective

hepatitis can reasonably be excluded. The mechanism of the spread of infective hepatitis is not clear, but the suggestion of droplet infection would indicate the isolation of these patients and the usual precaution of cap, mask, gown and careful toilet of the hands of all attendants upon them.

Treatment.—The American experience led to the recommendation of high carbohydrate (5 g. per kilo), high protein (2 g. per kilo), and low fat diet. Intravenous glucose solution may be required if the patient be dehydrated, or the stomach unretentive. Brewer's yeast is the most available source of vitamin B complex, and 0.5 g. two to three times a day is indicated. Vitamin K, 2 mg. intramuscularly daily, is used only if bleeding be a complication. Choline chloride 1.5 g. in 15 c.c. of water daily is likewise recommended. Plasma or whole blood transfusions are advised to combat hypoproteinemia. Van Rooyen and Gordon¹⁵ used convalescent serum without benefit in 9 patients. Recent studies indicate the protective action of the sulphhydryl compounds against hepatic injury by the heavy metals. Whipple²² found that methionine gave protection of the liver against chloroform poisoning in dogs. These observations have been extended to the human experience in arsphenamine jaundice by Beattie,²³ but it is too early to draw conclusions from his studies. Rest is an imperative element in all regimens of therapy. Graded exercise is an important factor in prognosis as well as rehabilitation. [Clinical relapses occur under premature strenuous effort.—W. S. M.]

REFERENCES.—¹J. Amer. med. Ass. 1942, 119, 1110 (edit.); ²Medicine, Baltimore, 1943, 22, 27; ³Brit. med. J. 1942, 2, 446; ⁴Ibid. 1943, 1, 474; ⁵"Sobie la Hepatitis epidemica o infecciosa en la Infancia"; ⁶Lancet, 1943, 1, 675; ⁷Quart. Jour. Med. 1943, 12, 139; ⁸J. Amer. med. Ass. 1942, 120, 51; ⁹Lancet, 1943, 1, 88; ¹⁰Brit. med. J. 1943, 1, 750; ¹¹J. Amer. med. Ass. 1943, 121, 1332; ¹²Jour. R. nav. med. Ser. 1943, 29, 153; ¹³Ibid. 170; ¹⁴Münch. med. Wschr. 1942, 89, 76; ¹⁵J. R. Army med. Cps. 1942, 79, 213; ¹⁶Quoted J. Amer. med. Ass. 1943, 122, 1186 (edit.); ¹⁷Acta path. microbiol. scand. 1939, 16, 427; ¹⁸Lancet, 1943, 2, 402; ¹⁹Brit. J. vener. Dis. 1943, Sept.; ²⁰Amer. J. med. Sci. 1925, 169, 59; ²¹Lancet, 1943, 1, 678; ²²Amer. J. med. Sci. 1942, 203, 477; ²³Lecture before Royal College of Surgeons, London, 1943, May 21.

HERNIA.

A. Rendle Short, M.D., F.R.C.S.

Inguinal Hernia.—According to R. S. Myers and R. Zollinger,¹ of Boston, about one patient in five who comes up for treatment for inguinal hernia complains of various vague abdominal symptoms. By no means all of these are cured of these symptoms by operating on their hernia. In two cases, it eventually turned out that their discomforts were due to abdominal carcinoma. The moral is, that proper investigation of such symptoms should be made, before herniorrhaphy is undertaken.

Squadron-Leader H. R. Arthur² describes the procedure which is followed out at an R.A.F. hospital. The operation is a combination of the Bassini and the MacArthur methods. He objects to a routine Gallie operation that the long incision in the thigh takes time, and may give trouble afterwards; to the floss silk method lately advocated by some Army surgeons, that it leaves a lot of foreign material in the tissues. After sewing the internal oblique and conjoint tendon to the inguinal ligament with catgut, a long strip of fascia cut from the external oblique aponeurosis but left attached to the pubic end, is used to reinforce the suture line, best quite loosely. The patient is 21 days in hospital, 21 days on sick leave, and 28 days on light duty. Commenting on this paper, Harold Dodd³ insists that one should define and suture the transversalis fascia as well as the muscles, using very fine silk. It is very valuable to include the edge of the rectus in the lowest suture to the inguinal ligament, using some stout ligature material; this relaxes the conjoint tendon, and closes the gap at its weakest point. External oblique aponeurosis can often be overlapped with advantage.

Reliable figures for the end-results of operations for hernia are not too plentiful, though statistics of a sort are often published. Major-General Max Page,⁴

PLATE XVI

INGUINAL HERNIA

(F. A. B. SHEPPARD)

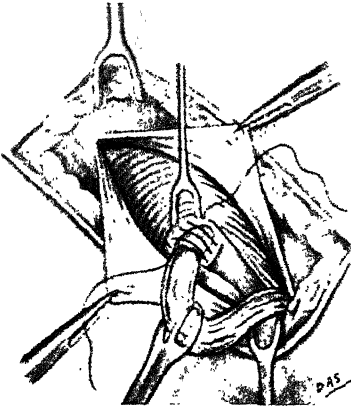


Fig. A.—The internal ring is being reduced to a size snugly enclosing the cord, by a continuous suture (of fine silk or nylon).

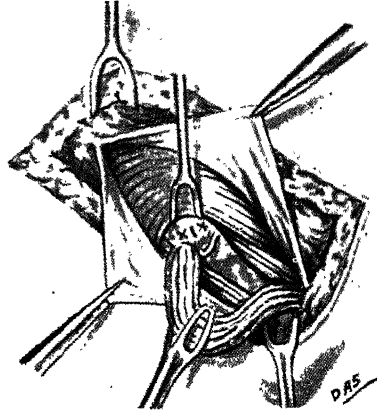


Fig. B.—The suture of the internal ring has been completed. In herniæ in which no further repair than this is considered necessary, the cord would not be displaced (as shown also in *Fig. A*). It would be left undisturbed, and the operation completed by suturing the cremaster muscle back in front of it, and by similarly suturing the external oblique muscle.

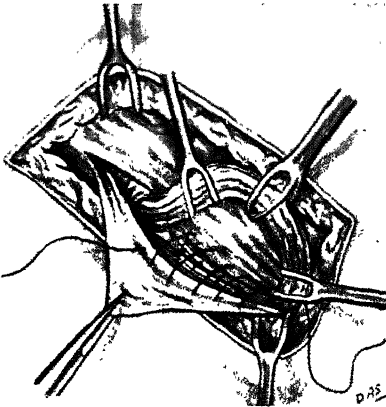


Fig. C.—The upper leaf of external oblique muscle is in process of approximation to the inguinal ligament for the full length of the inguinal canal, the first and most medial suture passing through the thickened periosteum of the pubic tubercle. A continuous silk or nylon suture is used.

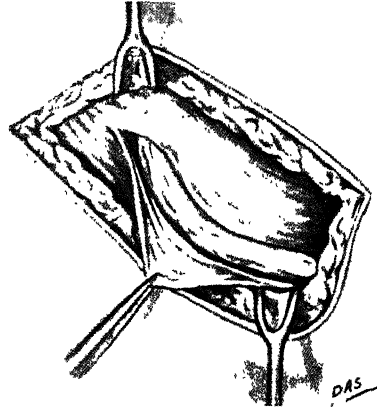


Fig. D.—The suture completed, the cord has been allowed to drop back into place.

Reproduced from the 'Indian Medical Gazette'

at a discussion at the Royal Society of Medicine, presented the following tables as a result of two inquiries into the after-history of police of the Metropolitan force operated on for inguinal hernia. The earlier report related to operations performed prior to 1934, the second to operations between 1936 and 1939, all investigated at least two years later :—

FIRST SERIES.—	No.	Recurrences	Per cent
No repair	29	4	13.8
Foster	144	31	21.5
Bassini	36	8	22.2
Other methods	4	—	—
SECOND SERIES.—	No.	Recurrences	Per cent
Simple excision of sac	80	8	9.3
Fascia lata repair	39	6	15.4
Other methods	17	3	17.6

Naturally, the more complicated methods were used for the least hopeful cases. Most recurrences took place within six months, but many were later, even years later. He concludes that for young men, under 35, the simplest operation is the best.

Brigadier Harold Edwards⁴ mentioned that in the first six months of 1942, 805 operations for recurrent hernia were performed in military hospitals, and it must be remembered that many men refuse a second operation. Far too many operations for hernia are performed by inexperienced surgeons. For Army purposes, certain patients should not be operated on : the small bulge in men of poor musculature, large scrotal hernias in pot-bellied men, and large recurrent hernias in men of poor physique. Most of the poor results follow the Bassini operation, which ought to be given up. Edwards considers that the usual site of recurrence is at the internal ring, and the essential point is to strengthen this and not to trouble overmuch about closing the gap between the internal oblique and the inguinal ligament mesial to the internal ring. This does not apply to large herniæ in older men, however. He was at first well-pleased with the results after using floss silk as a suture material, but later experience showed that sepsis was unpleasantly frequent, and the silk had to be removed. Dickson Wright warned against using silk and catgut in the same case ; this leads to sepsis.

F. A. B. Sheppard,⁵ of Vizagapatam, agrees that the main point is to restore a normal internal ring. The closure of this ring is shown in *Plates XVI*. He then sews the superior leaf of external oblique aponeurosis to the inguinal ligament, behind the cord, to reinforce the suturing of the internal oblique to the inguinal ligament. The inferior leaf is brought in front of the cord.

J. Ross Veal,⁶ of Washington, uses an osteo-periosteal transplant, derived from the tibia, to close the gap in repairing a direct inguinal hernia. The graft is sutured to the periosteum of the posterior surface of the pubes.

Occasionally the testicle swells after a herniorrhaphy. This should be looked for, especially during the first 48 hours. If it occurs, J. W. Baker and M. M. Evoy⁷ advise either releasing the sutures in the canal, or incising the testicular capsule, so that atrophy may be avoided.

Sliding Hernia.—According to C. C. Burton⁸ and C. Blotner, of Dayton, Ohio, these constitute 2 per cent of all inguinal hernias treated. Of 43 operated on and followed up, 6.9 per cent recurred. The method recommended is to sew the transversalis fascia to the inguinal ligament, bring the spermatic cord out in front of the aponeurosis of the external oblique, and overlap this aponeurosis, behind the cord, by suturing the incision in it, and also closing the external abdominal ring.

R. K. Brown,⁹ of Buffalo, advises opening the peritoneal cavity and drawing the bowel up out of the pouch. The sac is largely composed of the mesentery

of the colon turned inside-out; this drawing up restores the normal anatomy, and makes closure of the hernial orifice relatively simple.

Strangulated Femoral Hernia.—J. Jens,¹⁰ reporting 100 cases at St. James's Hospital, London, points out that most of them were sent with an erroneous diagnosis. This is due to the very important fact that in three cases out of four no pain is complained of at the hernial site. Local anæsthesia is safest, and the Lotheisen (supra-Poupart) approach is best. Fourteen patients died. It is hoped that dusting with sulphanilamide powder in resection cases will lower the high death-rate.

Spigelian Hernia.—Spontaneous lateral ventral hernia through the linea semilunaris (Spigelian hernia) is rare. Strangulation is frequent in these patients. L. P. River¹¹ reports 4 cases.

Spontaneous Diaphragmatic Hernia.—Spanish experience of this condition is related by S. Sala de Pablo.¹²

REFERENCES.—¹*New Engl. J. Med.* 1942, 227, 660; ²*Lancet*, 1942, 2, 387; ³*Ibid.* 555; ⁴*Proc. R. Soc. Med.* 1943, 36, 185; ⁵*Indian med. Gaz.* 1942, 77, 707; ⁶*Ann. Surg.* 1942, 116, 259; ⁷*Surg. Gynec. Obstet.* 1942, 75, 285; ⁸*Ann. Surg.* 1942, 116, 394; ⁹*Surg. Gynec. Obstet.* 1943, 76, 91; ¹⁰*Lancet*, 1943, 1, 705; ¹¹*Ann. Surg.* 1942, 116, 405; ¹²*Med. esp.* 1943, 9, 1.

HERNIÆ, MUSCLE. (See MUSCLE HERNIÆ.)

HYDATID DISEASE.

Lambert Rogers, M.Sc., F.R.C.S.

The surgical aspects of echinococcal disease were last discussed at some length in the MEDICAL ANNUAL for 1938. During the past year an excellent report has come from H. R. I. Wolfe,¹ of Cardiff, of cases occurring in Wales, where, as he shows, the disease is more prevalent than elsewhere in the British Isles. Manifestations of the disease are protean and diagnosis therefore difficult, particularly as the condition is regarded as rare and consequently apt to be overlooked. Wolfe points out that dogs are the chief source of human infection.

The dogs themselves become infected by feeding on the offal of infected sheep. Echinococcal cysts were found in 0.5 per cent of the sheep killed in one abattoir in the period 1934–1936. In most of the reviewed cases infection probably



Fig. 15.—Univesicular cerebral hydatid cyst.

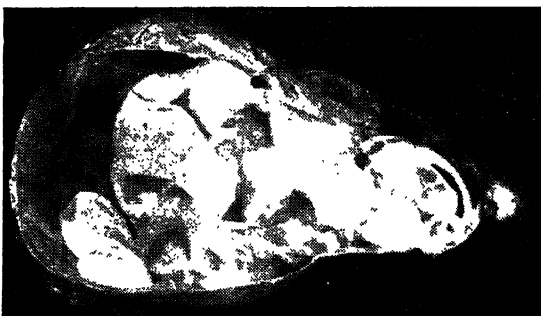


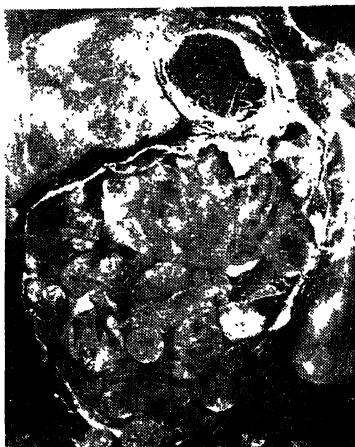
Fig. 16.—Univesicular secondary intraperitoneal hydatid cyst.

(Figs. 15–17 by kind permission of 'The Lancet'.)

occurred in childhood or early adult life. For a long period a hydatid cyst may remain quiescent; complications may then occur in the form of rupture, either

into the biliary passages, peritoneal cavity, or the adjacent bowel, or as calcification or suppuration. When hydatid disease manifests itself the condition is usually a serious one. Of 34 cases treated at the Cardiff Royal Infirmary between 1926 and 1938, 16 died. The liver is the commonest site of occurrence, the lungs the next common. (Figs. 15-17.)

Fig. 17.—Multivesicular hydatid cyst in the right lobe of the liver, with another cyst full of inspissated bile lying above and internal to it. The hæmorrhage into the adventitia following attempted dissection in this layer can be seen.



A. L. d'Abreu and Lambert Rogers² have reported an example of bilateral pulmonary cysts in a young miner, and from a review of the recorded cases conclude that bilateral pulmonary infestation is not common. Bilateral two-stage operations for removal were carried out. The patient was well and at work 3½ years later.

REFERENCES.—¹*Lancet*, 1943, 1, 795; ²*Brit. J. Surg.* 1943, 31, 153.

HYPERTENSION.

William Evans, M.D., F.R.C.P.

Blood-pressure in Young Subjects.—The opportunity of recording the blood-pressure in young subjects during emotional disturbances has emphasized the frequency with which the readings reach elevated levels. H. E. Lawrence¹ has recited his experience of this in 220 healthy adolescent students during the time they were sitting for their annual academic examination. He said that blood-pressure determination should be part of the examination of students, but only if the readings were checked by others recorded at one or more later dates, for the blood-pressure of adolescents is labile. Most of those showing an abnormally high pressure (9.5 per cent of the series) came from families in which hypertension was common. The frequency of abnormal response to the cold-pressor test amongst those showing the higher pressure values supported the impression that many of them were in a pre-hypertensive stage. Lawrence pointed to the need of continuing to observe such subjects until later life in order to evaluate the cold-pressor test as a predictor of hypertension in the pre-hypertensive state.

L. Brouha and C. W. Heath² recorded the blood-pressure in 265 students whose ages ranged from 17 to 22; all of them had been regarded as healthy after careful medical examination. From their study they concluded that there was a wide variation in the blood-pressure in healthy young subjects. Although the values far exceeded the usually accepted normal, they were nevertheless compatible with normal physiological reactions to emotional stress and hard muscular work. A systolic blood-pressure above 140 was not exceptional in medically sound subjects when exposed to emotional stresses.

Ætiology.—In over one-half of the patients with hypertension in which nephrectomy has been carried out for unilateral renal disease, the blood-pressure has not been lowered or has continued to rise after the operation. The factors which influence the success of nephrectomy in alleviating hypertension were studied in rats by H. S. Patton, E. W. Page, and E. Ogden.³ Permanent hypertension was produced by obstructing the blood-supply to one kidney, and this

kidney was later removed after varying time-intervals. Like the results in man, no lowering of the blood-pressure took place in half the rats, and complete relief of the hypertension was only brought about in 25 per cent. In the animals with residual hypertension albuminuria persisted, and histological examination of the remaining kidney showed vascular changes similar to those observed in human hypertension, and which apparently accounted for the continuation of the raised blood-pressure. If the affected kidney had become completely devoid of a blood-supply, its removal had no hypotensive effects. The greatest success following nephrectomy was in those animals with hypertension of short duration, and the severity of the hypertension did not appear to be important in determining the end-result. These findings are in agreement with those of C. Wilson and F. B. Byrom.⁴

In 100 cases of hypertension with an average blood-pressure of 210/130, renal biopsies were carried out by A. M. Master, H. H. Marks, and S. Dack⁵ in the course of splanchnic resections. Normal renal function was present in 60 per cent, and they all showed retinal vascular changes which varied from slight arteriolar narrowing to oedema of the optic discs. In contrast with the almost invariable finding of well-developed arteriolar disease in the kidney of hypertensive subjects at necropsy, 28 per cent of the biopsies showed no or insignificant vascular disease, and a further 25 per cent showed only slight changes. They concluded that morphological evidence of renal vascular disease in more than half the cases was inadequate as the sole factor producing the hypertension, and that in many of these and probably in others the hypertensive state preceded the renal vascular lesion, which probably aggravated the hypertension once it became established. They thought that these observations were not in keeping with the conception that renal ischaemia was the cause of hypertension in man.

Renal Hypertension.—G. O. Richardson⁶ has sought to determine the incidence of lesions which might cause narrowing of the main renal arteries, and their relation to essential hypertension in 32 consecutive necropsies on patients with hypertension and 113 without hypertension. In 25 of the 32 there was apparent stenosis of one or both main renal arteries by atherosclerotic plaques which were usually confined to a short segment of each artery near the aorta. In 8 with unilateral stenosis, microscopy failed to show any difference between the "ischaemic" and "non-ischaemic" kidney. Atherosclerotic plaques were only present in the renal artery of 8 of the 113 cases without hypertension, and in only 3 of these was the lesion comparable in severity with that found in the hypertensive cases. Richardson said that the results of this investigation suggested that such plaques may produce renal ischaemia and hypertension analogous to the experimental variety.

The results of pyelography in 528 patients with hypertension have been given by R. K. Ratliff and K. B. Conger.⁷ The pyelograms of 285 were negative and of 23 inconclusive. Among patients who gave positive tests there were 7 who might be treated and receive benefit from operation.

Progress.—While the cause of hypertension remains obscure and the treatment unsatisfactory, and while its importance as a prime cause of mortality in adult life looms ever greater, there is, nevertheless, reason for optimism in the near future and even at the present time. Clinical studies have contributed greatly to an increasing understanding of the course of the disease. These have indicated that while hypertension is not conducive to longevity it is compatible with longevity. R. M. Daley and others⁸ have evaluated some of the criteria which may permit an estimate of the outlook in any case of hypertension. They said that the following questions need to be answered: Does a state of hypertension exist, and if so what is its degree? Can a known cause for the hypertension be found? What is the extent of the organic changes in the heart, arteries,

arterioles, and kidneys? These among other considerations, including sex, age, and the presence of associated conditions such as diabetes and obesity, were important in estimating the life expectancy and the benefit which may follow from therapeutic procedures available at the present time.

REFERENCES.—¹*New Engl. J. med.* 1943, **228**, 381; ²*Ibid.* 473; ³*Surg. Gynec. Obstet.* 1943, **76**, 493; ⁴*Lancet*, 1939, **1**, 136; ⁵*J. Amer. med. Ass.* 1943, **121**, 1251; ⁶*Ibid.* 122, 405; ⁷*Ibid.* 1942, **120**, 794; ⁸*Ibid.* 1943, **121**, 383.

HYPERTHYROIDISM. (See THYROID GLAND.)

HYPOGLYCAEMIA. (See PANCREAS, TUMOUR OF.)

IMMERSION FOOT. (See also MEDICINE IN RELATION TO SHIPWRECK; FOOT, SURGERY OF.)
T. P. McMurray, F.R.C.S.

The extremely crippling deformity known as 'trench foot' was widely recognized and fully described during the last war. It resulted from long-continued exposure to cold and damp, especially in those situations where it was difficult or impossible for the soldier to remove his boots during long periods of duty in a trench. A condition of 'immersion foot', which in many respects is similar to trench foot, has been described during this war, although isolated cases were observed during the war of 1914-18. The factors involved are not only the prolonged exposure to the severe cold, but the continuous constriction of the tissues of the foot by the wearing of boots and stockings. Observations on 142 patients suffering from this condition have been made by Webster, Woolhouse, and Johnson,¹ and their findings and conclusions have been reported in the *Journal of Bone and Joint Surgery*.

These patients had all suffered exposure in lifeboats or on rafts for periods varying from 30 hours to 22 days, and during this period it had been impossible to keep the boats dry, in spite of constant bailing. Water to the depth of several inches was invariably present, and the only recorded temperature showed it to be from 34° to 36° F., which is only 3° to 5° above the freezing-point of blood, and 6° to 8° above the freezing-point of sea water.

When the patients were removed from the boats the feet were cold, swollen, and waxy white in colour, with scattered cyanotic areas. The only complaint made by the patients at the time was that their feet felt heavy, woolly, or numb, although in every instance the whole cutaneous area from the ankle downwards was anaesthetic to pain, touch, and temperature. Shortly after admission to hospital the swelling increased rapidly as the skin became red, hot, and hyperæmic with a complete absence of sweating, while the arterial pulse in the feet became full and bounding. In the more severely damaged areas—usually the toes, the distal portions of the dorsum, or the ball of the foot—the tissues remained cedematous and hot, and assumed a livid cadaveric appearance. In a number of these severely affected areas blebs, containing a straw-coloured fluid or extravasated blood, appeared on the surface. Many of the feet presented the appearance of incipient gangrene, the rapid swelling, increasing redness, and severe rise of temperature giving the picture of an intense vasodilatation with injury to the vessel walls. Anæsthesia, although invariably present, except in the mildest cases, was by no means constant, varying from a loss of sensation round the margins of the foot to a complete loss over the dorsum of the foot and over the lower two-thirds of the leg. In every instance the initial anæsthesia was replaced by an intense hyperæsthesia at an interval varying from the 8th to the 10th day after admission. The hyperæsthesia was ushered in as an intense burning sensation over the surface of the foot lasting for at least 24 hours, followed by stabbing, shooting pains in the ankle and mid-tarsal region, radiating to the tips of the toes, with a persistent tingling sensation which

spread over the whole foot in the intervals between the shooting spasms. The intensity of the discomfort diminished slowly over a period of three or four weeks, lasting, as a rule, longer in the older patients in whom arteriosclerotic changes could be demonstrated. Realizing the tragic results which follow the too rapid warming of tissues injured in this way, a clinical trial of treatment of immersion foot by dry refrigeration was made at Camp Hill Hospital, Halifax, Nova Scotia.

From the complete absence of sweating in the affected tissues, and from the failure of response to the injection of adrenaline, it was evident that the sympathetic control was lost and no improvement could have been gained by ganglionectomy, a form of treatment which has been advocated in a number of articles in French literature. The response of different members of the crew of a ship varied to a considerable degree with their occupation. Thus, the stokers and engineers who normally work in a hot atmosphere were, as a rule, more severely affected than those who were normally exposed to cold and damp.

Method of Treatment.—The injured feet were first carefully swabbed with alcohol, while pads of sterile gauze were placed between the toes, after which the whole foot was enclosed in a sterile towel. Five carefully dried ice-bags were then placed around each foot over the towel, and the whole enclosed in an oil-silk bag, over which layers of wool were applied, forming a continuous coating as far as the upper part of the calf of the leg. The feet and legs were then elevated on pillows and the ice-bags replaced every four hours. In some of the less severely injured feet ice-bags and covering were not used after the preliminary cleansing, the temperature being regulated by the use of a fan which drove a current of air directly on to the more severely injured areas.

Results of Treatment.—Within a few hours after the application of the ice-bags the patient was completely comfortable; the oedema rapidly subsided to such an extent that in many cases the skin became wrinkled at the end of four hours. This favourable reaction cannot be due to posture alone as it was noted that the oedema returned rapidly if the ice-bags were removed. The blebs became absorbed without opening, even when their contents were hæmorrhagic. The rationale of this treatment rests on the presumption that the tissue damage results in an intense vasodilatation, associated with actual damage to the vessel walls and damage to peripheral nerves or end-organs. Under these circumstances a vicious circle is established with a resulting oedema and transudation of serum and blood, all of which contribute further to the oxygen deficiency which is already present in injured tissues. From clinical observations, and from the small amount of histological material which became available, it was apparent that the vessels adjoining the injured tissues had become the seat of an extending thrombosis. It is suggested by the authors that, in order to prevent this widespread injury, boots and any constricting footwear, if wet, should be removed and oil or heavy grease applied to the feet while the patient is exposed. When safety has been reached the patient should be lifted and should not be allowed to walk, boots should be removed immediately, massage should never be attempted, and the feet should be exposed and elevated. In the hospital strict asepsis is essential, and the injured feet should be treated by cooling, either by simple exposure, air current, or the application of ice-packs during the hyperæmic period. Superficial loss of tissue, although occasionally seen, is usually not severe, and may be successfully treated by skin grafting.

REFERENCE.—¹J. Bone Jt Surg. 1942, 24, 785.

IMPETIGO CONTAGIOSA. R. M. B. MacKenna, M.A., M.D., F.R.C.P.

The full aetiology of impetigo is not yet known. Ever since Sabouraud¹ clarified the conception of impetigo by separating the form of staphylococcal

folliculitis known as Bockhart's impetigo from the impetigo contagiosa of Tilbury Fox, disputes have occurred concerning the cause of the disease. Some have believed that impetigo is streptococcal in origin; others that staphylococci may also be incupated. Recently S. Epstein² suggested that there were two forms of the malady and that their clinical features varied in accordance with the aetiology. Thus, streptococcal impetigo is characterized by lesions with thick, stuck-on, honey-coloured or yellowish crusts, the proximal lymphatic glands being usually enlarged, while staphylococcal impetigo is primarily bullous in character, and after the bullæ have ruptured the lesions become covered with thin, flat, varnish-like crusts. Those who believe in these clinical differences admit that it is not always possible to make a clinical distinction between the two types of impetigo, and that mixed infections do occur.

Two independent groups of military investigators have recently studied the aetiology and treatment of impetigo in adults. J. W. Bigger and G. A. Hodgson³ investigated 130 cases of the disease in a series consisting of 96 per cent men and 4 per cent women; 230 cultures were made, and of these 97 per cent yielded staphylococci—almost all *Staph. pyogenes*—and 32 per cent *Str. pyogenes*. Staphylococci were present without *Str. pyogenes* in 67 per cent of the cultures, whilst *Str. pyogenes* was present without staphylococci in only 2 per cent. Cultures from 17 unopened vesicles from 10 patients in the early stages of the disease yielded only *Staph. pyogenes*. The longer the disease had existed the higher was the proportion of cases yielding *Str. pyogenes*.

H. L. Sheehan and A. G. Fergusson⁴ investigated 97 soldiers having active uncomplicated impetiginous lesions. They found that *Staph. aureus* was present in nearly all impetigo lesions from the earliest stages, whereas streptococci were only found after the initial blister had been replaced by a crust.

These findings afford fairly conclusive proof that in adults impetigo is usually of staphylococcal origin. Bigger and Hodgson state that, in their opinion, streptococci are seldom, if ever, the cause of the disease. Nevertheless, when these workers attempted to produce the disease experimentally on the arms and legs of unaffected persons and on the unaffected skin of the faces and necks of persons suffering from the disease, they failed to produce any lesions which could be called impetigo. Sheehan and Fergusson also carried out a series of inoculations of human skin with various organisms cultured from impetigo lesions, and also with the fluid taken from such lesions. Their attempt to reproduce impetigo by inoculation of undamaged skin was unsuccessful. Success was obtained only when the skin was thoroughly scarified. They found that inoculation of human skin with *Staph. aureus* reproduced the disease with about the same frequency as inoculations with fluid from the lesions of spontaneous impetigo. Inoculations with *Strep. hæmolyticus* and with *Staph. albus* did not produce any lesions of this type.

In order to explain their failure to reproduce experimentally the lesions of impetigo, Bigger and Hodgson postulate the hypothesis that impetigo is due to the combined action of *Staph. pyogenes* and an unknown inanimate factor—"x"—distributed throughout the body, or at least in the skin, of certain persons. It is their belief that impetigo is produced when *Staph. pyogenes* is inoculated into the skin of a person with "x". This theory possibly explains why Sheehan and Fergusson were not able to produce impetigo in untraumatized skin. The postulation of "x" also may explain why in some cases impetigo is almost a self-limiting disease, whilst in others it spreads rapidly and widely over large areas.

TREATMENT.—Opinion is at present divided as to whether or not compounds of the sulphonamide series should be used in the routine treatment of the disease. A corporate opinion is beginning to formulate that sulphonamides should not be

used indiscriminately in the treatment of minor conditions, for—if used injudiciously—the patient may be sensitized to these drugs and if at some later date he suffers from pneumonia or from a severely septic injury, his life may be placed in jeopardy because of the treatment he received previously for a trivial malady. (It should be noted in passing that hypersensitivity to one of the sulphonamide compounds usually—but not invariably—implies hypersensitivity to others of the series⁵.) If this view is accepted, it is obvious that the best treatment for many cases of impetigo is by means of the well-established remedies such as *lotio cupro-zincica*, sulphur-calamine lotion, 2 per cent aqueous solution of gentian violet, silver nitrate, or hydroxyquinoline,⁶ etc. But in the treatment of cases in which the disease involves large areas, or is resistant to other forms of therapy, sulphonamides have their place. Most authorities agree with G. A. G. Peterkin and E. C. Jones⁷ that if one of these drugs is to be used, *sulphathiazole* is the compound of choice for local application, and if applied night and morning in a concentration of 5 per cent in a cream or paste, it should cure the majority of cases within a week. There is some divergence of opinion as to the best base for sulphathiazole ointment. Probably an emulgent base of the oil in water type is the best which is generally available, but some prefer to incorporate the drug in a simple zinc paste. H. L. Sheehan and A. G. Fergusson have recommended a compound paste which, in a series of 25 cases, cured most within 5 days, and all within 8 days :—

Copper sulphate	gr. 3	Zinc oxide	oz. $\frac{1}{2}$
Zinc sulphate	gr. 2	Powdered starch	oz. $\frac{1}{2}$
Precipitated sulphur	gr. 5	Soft paraffin	oz. 1
Sulphathiazole	10 tablets powdered		

They recommend that this should be applied daily after the crusts have been removed.

Sulphathiazole powder has its uses as a local application and may be preferred to paste or ointment. Sulphathiazole may be given concomitantly by the mouth, the initial dose for the average adult of $9\frac{1}{2}$ stone being 2 g. followed by 1 g. 4-hourly for 2 days, 1 g. 6-hourly during the 3rd and 4th days, and 1 g. 8-hourly on the 5th and 6th days. It must be remembered that sensitization to sulphathiazole can readily occur, particularly if combined local and oral therapy is prescribed. Treatment with this drug, either locally or by the mouth, should not be continued for longer than 7 days.

T. N. Harris⁸ has drawn attention to the use of a 20 per cent suspension of microcrystalline sulphathiazole, which he claims cures the lesions within one day and stops the spread of the disease. The technique of the treatment is simple ; a drop or two of the suspension is poured on to a small gauze dressing, which is then applied to the affected area and left in situ for 24 hours. Unfortunately micro-crystalline sulphathiazole is in short supply.

REFERENCES.—¹*Ann. Derm. Syph.*, Paris, 1900, 62, 320 ; ²*Arch. Derm. Syph.* 1940, 42, 840 ; ³*Lancet*, 1943, 1, 544 ; ⁴*Ibid.* 547 ; ⁵*War Mem.* No. 10, *Med. Res. Coun.*, Lond. 1943, 36 ; ⁶*Arch. Derm. Syph.* 1938, 37, 307 ; ⁷*Brit. med. J.* 1943, 1, 318 ; ⁸*J. Amer. med. Ass.* 1943, 121, 403.

INDUSTRIAL DERMATITIS. (See also CHEESE ITCH.)

R. M. B. Mackenna, M.A., M.D., F.R.C.P.

Sibyl Horner¹ has drawn attention to the fact that although dermatitis in industry is not notifiable in this country, the number of cases voluntarily reported to the Factory Department (now of the Ministry of Labour and National Service) increased from 2000 cases in 1938 to nearly 5000 in 1940. In the same years the number of cases which actually received compensation for dermatitis or ulceration of the skin produced by dust or liquids was 2735 in 1938 and 6196 in 1940. She states that the common causes of industrial

dermatitis at the present time are oil, chemicals (including explosives), alkalis, solvents, or degreasing agents. Cleansers, often alkaline or degreasing in character, are sometimes responsible for more dermatitis than the industrial materials handled.

The chemicals which cause inflammation of the skin may be classified as : (1) primary irritants, and (2) sensitizing agents (sometimes called "specific irritants"). The former have been defined by L. Schwartz and L. Tulipan² as substances which will cause burns or dermatitis on normal skin. Primary irritants provoke dermatitis only in hypersensitive persons. E. D. Osborne and J. J. Hallett³ have found that persons hypersensitive to a specific chemical substance which, in full strength, is a primary irritant, will always give a positive patch test to a 10 to 1 dilution.

Under the auspices of the Council of Industrial Health, the Committee on Occupational Dermatoses of the American Medical Association has published a comprehensive report⁴ on the recognition and prevention of industrial dermatitis. In this report a primary skin irritant is defined as a substance which "in a given concentration, in a given vehicle, and after a given manner and length of exposure, produces a clinically manifested irritation on the skin of a majority of persons not previously sensitized to that substance"; a sensitizing agent is defined as one that "increases the tissue capacity to react to subsequent exposure," and it is noted that substances that produce reactions only on the skin of persons who are hypersensitive to that substance are not primary irritants.

It is usually accepted that in order to differentiate between occupational and non-occupational dermatitis, the following points have to be considered :—

1. Is the eruption presented by the patient similar in character to the eruption which can be produced in susceptible subjects by the irritant to which he has been exposed?

2. Is the time relationship between exposure to the agent and the onset of the dermatitis correct for that particular agent and the eruption presented?

3. Is the alleged site of the onset of eruption the site of maximum exposure to the irritant?

4. Have similar cases previously occurred in individuals carrying out similar work?

5. So far as can be ascertained, has there been any exposure outside the work which can be implicated as the cause of the eruption? For example, the rash from which a baker suffers may not be due to his trade but, e.g., to the primula which adorns his dining-room table.

The importance of these criteria for diagnosis are emphasized by the Committee, which also draws attention to the following two matters which are of much value in corroborating a diagnosis of industrial dermatitis : (a) The evidence of previous attacks arising after exposure to a suspected deleterious agent, followed by improvement and apparent cure after the cessation of exposure ; (b) The result of patch tests performed and interpreted by competent dermatologists.

PROPHYLAXIS.—The prevention of occupational dermatitis is of great importance. Briefly, as Sibyl Horner has emphasized, preventive measures consist of the selection of suitable personnel to whom is explained the procedure of protection, inspection, and cleanliness. With regard to the selection of personnel, it should be remembered that to remove a workman from a job that is known to be potentially harmful to him and to place him in more suitable employment, is an act in his own interest as well as in the interest of his employer. But difficulties arise in practice when an employee who has specialized in his task, and who has spent many years in acquiring his skilled knowledge of his trade, has to be advised that he should cease to work in that field, and has no

alternative but to seek employment in the open labour market. This difficulty could largely be obviated by suitable medical examination of candidates for apprenticeship in many trades.

In the investigation of a case to determine the suitability of a candidate for a job in which there are dermatological hazards, full inquiry should be made as to the family history, for persons from families prone to allergic disorders should not be encouraged to undertake employment where there is a hazard of dermatitis. The patient's previous medical history, particularly with regard to cutaneous disease, should be considered. Men with dry or ichthyotic skins should not work with solvents or degreasers; blonde persons should not handle photo-sensitizing agents.

Organized instruction of employees in the hazards of trade or occupation, and in the methods of combating and minimizing these hazards, are recommended by the American Committee on Occupational Dermatoses. In first-aid training emphasis should be laid on the importance of preventing dermatitis, of attending to minor injuries, and attention should be drawn to the necessity of personal hygiene of the skin and the care of clothing.

The provision of adequate non-irritating cleansing agents is of importance. L. Schwartz⁵ states that "a normal industrial cleanser for general use should consist of a super-fatted neutral toilet soap containing a wetting agent or synthetic detergent. . . . It should contain a minimum of free alkali and have a pH of 10 or less in a 1 per cent solution. It should not contain silica, quartz, pumice, feldspar, rosin fillers, or organic solvents."

Sulphonated oils have been used as skin cleansers in cases in which the use of soaps has been undesirable; some prefer alkyl sulphonates as soap substitutes, believing them to be less irritant. Formulæ for soap substitutes are given in the above report of the American Committee on Occupational Dermatoses.

In a factory, posters may be an effective way of conveying information. Workers should be encouraged to seek advice for non-occupational skin disease, for, for example, minor degrees of folliculitis in oil workers or machinists may lead to much trouble, and seborrhoeic dermatitis may be the basis for the development of an eczematous occupational contact dermatitis. Some believe that fungous infections of feet and groins may act as sensitizing and predisposing agents to contact dermatitis of the hands and forearms, and therefore advise that such foci of infection should be sought and eradicated. The possible predisposing influence of epidermophytosis of the feet in causing oil dermatitis of the hands has been demonstrated by A. G. Kammer and R. H. Callahan.⁶

Protection.—The protection of the skin of the workers does not solely depend on the use of protective clothing or the application of barrier substances to their skins. The installation of mechanical appliances to reduce hand operations and contacts; the provision of simple tools and brushes with proper handles to replace dirty rags and the direct application of chemicals by hand; the erection of suction fans for the removal of deleterious dusts, and the provision of shower baths and clothes lockers: these and similar measures may be introduced after collaboration between the medical adviser and all parties concerned. The issue of gloves, aprons, and garments impervious to the particular chemicals which constitute the known hazard are obvious prophylactic measures.

The importance of issuing suitable barrier substances to the workers (and the instruction of the workers in the application of these substances) is emphasized by all writers on this subject. This matter was discussed by A. M. H. Gray⁷; L. Schwartz⁵ has more recently reviewed the field and has described six classes of protective applications. The simplest is a vanishing cream, which fills the pores with soap and facilitates the removal of dirt when washing after work. The second is the ointment rich in fats (e.g., lanolin and castor oil) which protects

the skin against water-soluble irritants, petroleum oils, and, to some extent, against greases. The third is a protective ointment which contains specific chemicals to neutralize the substances which constitute the hazard; thus boric acid and benzoic acid may be incorporated in ointment issued to alkali workers, and the well-known anti-gas ointment issued to the A.R.P. worker is an example of this type of protective. The fourth is an ointment containing inert powder which adheres to the skin, and thus forms a protective covering. The fifth is the protective application designed against photo-sensitizing agents such as heavy coal-tar and oil distillates, which contains some 88 per cent of lanolin and castor oil with titanium dioxide and other ingredients. The last is the 'invisible glove' type of barrier which leaves a thin, protective, invisible, elastic film on the skin. 'Invisible gloves' may be water-soluble or water-insoluble.

There is an increasing body of opinion that no barrier substance is universal in its application, and that these substances should be issued only after a chemist with a special knowledge of these matters has considered the problem with the medical adviser and representatives of the management and the employees; a decision can be made concerning the type of barrier which best meets the hazards involved, and the chemist can adapt the formula of the barrier to meet these particular hazards. Certain firms have specialized in this work.

Attention has been drawn to cutting oils as productive of skin eruptions. R. Klaber¹ states that whilst ordinary lubricating oils only cause oil acne and never produce a true dermatitis, cutting oils are causing much dermatitis. F. A. E. Silcock has seen many operatives who have worked for many years without difficulty with sternal cutting oil, but when they have been put on high-speed steel and used sulphurized cutting oil, they have developed dermatitis. The risks arising from the use of cutting oils have been noted in America as well as in the United Kingdom, and this hazard of modern industry is discussed in the Report of the American Committee quoted above.

REFERENCES.—¹*Proc. R. Soc. Med.* 1942, 35, 701; ²*Occupational Diseases of the Skin*, London, 1939; ³*New York St. J. Med.* 1942, 42, 1529; ⁴*J. Amer. med. Ass.* 1943, 122, 370; ⁵*M. Clin. N. Amer.* 1942, 26, 1195; ⁶*J. Amer. med. Ass.* 1937, 109, 1511; ⁷*Med. Annu.* 1940, 118.

INFANTILE PARALYSIS: TREATMENT.

T. P. McMurray, F.R.C.S.

The recognized and generally accepted treatment of infantile paralysis can be summed up as the alleviation of the febrile state of the patient, combined with long-continued rest and relaxation of the paralysed muscles. This scheme has been adhered to very closely by the majority of surgeons, and has been rigorously enforced, especially in the early stages of the disease while muscle tenderness was the outstanding feature. The followers of this routine of treatment were supported in their beliefs by the development of gross contractures and deformities in the limbs of the patients in whom this protection from strain had been neglected. Doubts as to the necessity, or even the advisability, of this apparently essential fixation have arisen during the past ten years, following the work and writings of Sister Kenny, who acted originally as a Superintendent Masseuse in Australia. As a result of very considerable work among children suffering from infantile paralysis Sister Kenny claims that prolonged fixation and immobilization lead to unnecessary muscle wasting, contractures and deformities, and a loss of muscle sense and co-ordination.

During the last decade much has been written for and against the method of treatment advocated by Sister Kenny, the first reports coming from Australia, the latter from America, to which her work has now transferred its headquarters. Steindler¹ has written a thoughtful article comparing the advantages of the two types of treatment, the results obtained by the older or conventional type with those following the use of the Kenny method. The conclusions arrived at in this article are important and merit grave consideration.

In the first place Steindler and his associates are firm in their belief that contractures and deformities which are seen following infantile paralysis are not always the result of the unopposed action of the non-paralysed group of muscles. They have found these contractures developing in patients in whom the paralysed limbs had been adequately immobilized from the onset of the disease, as well as in those in whom treatment had been neglected. These contractures were not always caused by the pull of unopposed active muscles ; on the contrary, they were found frequently in muscles which were apparently severely paralysed, particularly so when the quadriceps and the erector spinæ groups were involved. In their experience contracture and fibrosis of the completely paralysed group had been observed in at least 25 per cent of those patients in whom splinting had been adequate and continuous. Where this rigidity occurred, subsequent mobilization of the knee-joint proved to be extremely difficult, in spite of long-continued physiotherapy. These contractures did not only appear late on in the disease, but could be observed as early as three weeks following its onset. The shortened quadriceps, though incapable of active contraction, became hard and indurated, and if an attempt was made to flex the knee, pain and tenderness were complained of in the muscle mass, indicating that the resistance was present in the muscle, and not in the peri-articular structures. Apparently this shortening and fibrosis of the paralysed muscle could not be of the same nature as a fixation contracture, such as is seen after plaster immobilization of normal muscle, as it developed rapidly under fixation and was even more resistant to mobilization. Similar changes in muscle could be observed in other areas of the body ; thus, the very resistant deformity of paralytic scoliosis might develop and increase in severity for at least two years following the onset of the disease.

The tissue changes of infantile paralysis were not confined to the muscles, but were potent also in the bones and ligaments ; thus, following a severe paralysis in the shoulder or hip region, dislocation of the joint was frequently observed. From this it is assumed that the tendons, ligaments, and capsular reinforcements take part in the pathological changes, the dislocation being the direct result of their loss of tone and elongation. Similarly, in the long bones of paralysed limbs gross changes rapidly appeared ; these were obvious in the radiograph, which showed increased bone translucency, shortening in length, and also discrete transverse bands of bone absorption.

The shortening of the long bones which was so frequently seen has never been explained satisfactorily. That lack of static function was not the determining factor in its production was shown in a study of 160 cases. From this it appeared that walking and weight-bearing played little if any part in determining the amount of ultimate shortening. It would appear from the figures of this investigation that the age of onset of the disease, and the severity and extent of the paralysis, are much more potent factors in determining the eventual length of the limb. From the very careful observations made in this investigation, Steindler has arrived at certain conclusions as to the value of this newer form of treatment for infantile paralysis, especially in the acute and subacute stages of the disease. In arriving at these conclusions he has realized that, although the motor loss from involvement of the anterior horn cells is the principal characteristic, it is by no means the only pathological feature of infantile paralysis, and the treatment must be influenced by the additional factors of pain, muscle spasm, contractures, and loss of muscle control. He believes that the pain, spasm, and spasmodic contractures arise from proprioceptive stimuli, the effects of which can best be countered by the frequent application of hot packs, as suggested by Sister Kenny. Contractures of the paralysed muscles cannot—in Steindler's opinion—be prevented by immobilization, but must be countered

by the employment of early motion, which in the paralysed limb must be of the passive type. For the treatment of the mass muscular movements in the affected limb, which usually follow the recovery of motor power, individual muscle training holds out the greatest hope of early recovery of motion.

The author, however, does not follow in its entirety the teaching of Sister Kenny, who believes that the use of splints is inadvisable at any stage of the disease. He proposes, therefore, to continue as before the use of splints and braces for ambulatory patients where the static function of standing or walking demands it, and especially since it is necessary to protect the relaxed periarticular structures of the knee and ankle.

REFERENCE.—*J. Bone Jt Surg.* 1942, **24**, 912.

INFECTIOUS DISEASES: EFFECT OF EVACUATION.

Ralph M. F. Picken, M.B., Ch.B., B.Sc., D.P.H.

P. Stocks,¹ in a minute statistical investigation of the records of incidence of scarlet fever and diphtheria during 1939 and the first half of 1940, shows that the decline of these diseases generally throughout the country masked an interesting difference in their behaviour as between evacuation, neutral, and reception areas. Removal of some 30 per cent of the children under 15 from evacuation towns, coupled with the closure of schools, was followed by a fall of 40 per cent or more in the estimated rate of diphtheria amongst the children who remained, compared with only 9 per cent in the neutral areas, by the first quarter of 1940. Influx of children drawn from evacuation towns to the reception areas, with consequent increase in their population under 15 by about 30 per cent, was followed by an immediate rise of diphtheria incidence among the native children amounting to 60 or 70 per cent, but the rate in the whole population of children in these areas declined again within six months to its original level. The course followed by scarlet fever was similar, but the higher rate in reception areas was more lasting. The later wave of evacuation in the summer of 1940 had a similar but less marked effect on the native children of reception areas, at least when the newly evacuated children belonged to the same evacuation areas as before.² Stocks also shows that the interruption in the periodic waves of measles and whooping-cough,³ which was a notable feature of the year 1939–40 immediately following the outbreak of hostilities, was not uniform throughout the country. The delay in the onset of the expected epidemics was greatest in evacuation areas, and conformed in time with the varying rates of restoration of full school attendance. The neutral towns were intermediate, and the reception towns reached their maximum half a year earlier than the neutral groups. Some of the evacuation towns still had a higher density of children than the neutral, and the main reason, in Stocks' opinion, why the children escaped during the first autumn and winter of war-time was the cessation of school attendance.

A. H. Gale³ agrees that school closure was a more important factor than mere thinning of the population, and points out that its influence was not counteracted by congregation in public shelters, at least in London, since only 9 per cent of the people frequented them at the height of the attack. School closure on this scale, however, would be quite impracticable as a measure for regular use in the control of epidemics.

REFERENCES.—*J. Roy. stat. Soc.* 1941, **104**, Part 4, 311; ²*Ibid.* 1942, **105**, Part 4, 259; ³*Proc. R. Soc. Med.* 1943, **36**, 97.

INFECTIOUS MONONUCLEOSIS. (*See GLANDULAR FEVER.*)

INFESTATION AND INTELLIGENCE.

R. M. B. MacKenna, M.A., M.D., F.R.C.P.

G. A. Hodgson¹ has shown that groups of patients suffering from different skin diseases may differ in their average intelligence. Using sets A, B, and C of the RECI Progressive Matrices Test he found that in a series of military patients with skin diseases, the highest proportion of low intelligence occurred in the group of men suffering from parasitic infestations, including scabies. In one of his series, among the infested patients the proportion of men of sub-normal intelligence amounted to 56 per cent.

K. Mellanby, A. L. Northedge, and C. G. Johnson² contest this view, and report that after subjecting 316 men to the whole five sets of the RECI Progressive Matrices Test they found that there was nothing to suggest that in a group of men suffering from scabies there was an abnormally high proportion of men of low intelligence.

R. M. B. MacKenna³ publishes a table compiled by G. R. Hargreaves showing the proportion of scabetic recruits of different intelligence levels in a series of 37,330 men. He suggests that whilst Hodgson's figures are an over-estimation of the relation between scabies and low intelligence, nevertheless a positive significant relationship does exist, particularly in the very lowest intelligence group.

H. R. Rollin,⁴ using the G.V.K. Test devised by W. Stephenson of Oxford, assessed the intelligence of 312 females (recruits for the W.A.A.F.) infested with pediculosis capitis, and compared the scores with those obtained in a group of 312 uninfested female recruits. There was a marked difference in the scores of the two groups, the lowest scores being found in the infested group, suggesting that pediculosis capitis is more prevalent among the less intelligent women.

Those who believe that there is a relationship between low intelligence and infestation emphasize that this does not mean that persons of low intelligence are more susceptible to parasitic infection than others. Very many factors are involved, but an idiosyncratic hypersusceptibility peculiar to persons of low intelligence is not one of them.

REFERENCES.—¹*Brit. med. J.* 1941, 1, 316, and *Lancet*, 1941, 2, 791; ²*Lancet*, 1942, 2, 596; ³*Brit. med. J.* 1943, 2, 191; ⁴*Ibid.* 1, 475.

INFLUENZA.

H. Stanley Banks, M.A., M.D., M.R.C.P., D.P.H.

Bacteriology: New Laboratory Methods.—F. M. Burnet et al.¹ investigated a typical epidemic due to Influenza Virus A in military camps in Victoria. Two new laboratory methods were used. The first is the most convenient method yet introduced for the primary isolation of the virus of influenza. It consists of the injection of filtered throat washings from patients in the first two days of illness into the amniotic cavity of twelve-day chick embryos; the amniotic fluid drawn off after 3 or 4 days' incubation provides a suspension of the virus. The second method is a test for the presence of the influenza virus. It depends on the discovery of G. K. Hirst² that this virus is capable of agglutinating guinea-pig and fowl red-cells. By these two methods not only can the virus be readily isolated, without the use of ferrets, but the serum of patients can be tested for antibody content, since specific anti-viral sera inhibit the red-cell agglutination by the virus. In the work under review virus A was isolated from 8 out of 10 patients, and the serum of patients in the acute and convalescent stages showed a sharp rise in antibody. As compared with an unselected camp population the initial antibody titres of influenza patients were significantly lower.

Immunology and Prophylaxis.—F. M. Burnet³ attempted to immunize human volunteers with living attenuated virus. A strain of B virus was attenuated

by 40 amniotic passages in chick embryos. It was administered into each nostril and to the back of the throat by means of a de Vilbiss atomizer with nasal nozzle. The subjects were tested for influenza antibody by Hirst's method. Those with initially low antibody level responded with a significant increase. It is suggested that by some such method of active immunization the relatively small proportion of people who at any one time are highly susceptible to influenza could be brought into the larger group of normally resistant people who do not contract influenza.

Epidemiology.—Deaths from influenza in England and Wales numbered 3401 in 1942 compared with 6901 in 1941 and 11,482 in 1940.⁴ Two thoughtful papers on the epidemiology of influenza by the joint discoverers of Virus A (C. H. Andrewes⁵) and of Virus B (T. Francis jun.⁶) give an excellent account of recent advances and how they might be utilized in the control of epidemics and pandemics. They should be read in the original, as they cannot be adequately summarized. Andrewes attempts a unifying concept to explain the vagaries of endemic, sporadic, epidemic, and pandemic influenza in the last 90 years. In Britain there is a two-yearly rhythm of influenza with activity practically confined to the three months January, February, and March. This seems to coincide roughly with that occurring on most of the European continent and in North America, and even in the Southern hemisphere there is a not dissimilar rhythm. Where then, he asks, is the virus between epidemics, i.e., for about twenty-one months out of the twenty-four. To find a solution to this puzzle Andrewes postulates seven grades of influenza virus: Grade I, basic virus, stripped of the properties by which it can be detected by laboratory methods and therefore possibly a mere latent virus persisting harmlessly in the cells of human carriers; Grade II, virus slightly increased in virulence and able to cause "Influenza Y" because no A or B properties can be detected; Grade III, virus which has acquired the ability to infect ferrets and to make A antigen; Grade IV, virus which causes the production of A antibodies in patients and can be adapted to infect mice after passage through ferrets; Grade V, viruses which have caused widespread outbreaks, as in Britain in 1933 and 1937, and can infect ferrets and mice with ease; Grade VI, the virus which became pandemic among young adults about June, 1918; Grade VII, the virus which about August, 1918, acquired the power of causing many fatal pneumonias.

REFERENCES.—¹*Med. J. Aust.* 1942, **2**, 371; ²*Science*, 1941, **94**, 22; ³*Med. J. Aust.* 1942, **1**, 673; ⁴*Summary Rep. Min. Hlth.* 1943, 48; ⁵*Proc. R. Soc. Med.* 1943, **36**, 1; ⁶*J. Amer. med. Ass.* 1943, **122**, 4.

INTERVERTEBRAL DISCS, RUPTURED. (See also LOW BACK PAIN AND SCIATICA.)

Geoffrey Jefferson, M.S., F.R.C.S.

Ruptured Discs and Sciatica.—There are few to-day who deny that the most common cause of sciatica is rupture of the intervertebral disc. (It should be noted in passing that this name is superseding the original one of herniation of the nucleus pulposus; alternatives are—herniation or protrusion of the intervertebral disc.) A ruptured or diseased disc is by no means the only cause of back pain, but it is certainly the most frequent reason for low back pain plus pain in the sciatic distribution.

In some clinics in the U.S.A. the number of cases operated on is now very large indeed. The recognition of the syndrome by Mixter and Barr of Boston in 1934 was commented on in these pages. Mixter has now operated on upwards of 400 cases, but at the Mayo Clinic the numbers run well over 2000, and the 1000 mark has been approached at San Francisco and Ann Arbor. Walter Dandy in Baltimore operated on some 300 cases in little more than a

year. The conservative and critical reception with which the new pathological entity was received in this country was but natural, and more to-day admit the validity of the syndrome than are convinced that it is as easily cured by operation as some writers have claimed. This is particularly so in the Services, where no operation can be accepted as good which does not return a man to front line duty, an end which is not reached in more than about 60 per cent of the cases. This does not mean that a larger proportion are unrelieved of their pain, but indicates that there is a percentage which is not completely cured when put on the very hard exercises which modern military training demands. It must be admitted also that we have no means at present of being able to tell beforehand with absolute certainty when an exploration will be negative, for some patients who ought by all the rules to have a ruptured disc show no disc alteration to the naked eye.

W. E. Dandy¹ believes that this is always a faulty observation, and that apart from a tumour of the cauda equina or secondary malignant disease of the spine, low back pain and sciatica are invariably caused by ruptured discs. He has drawn attention to what he calls "the concealed disc". This is a bad title. What he means is a disc from which there is no backward protrusion but which is pathologically altered so that a blunt-pointed instrument easily sinks into it under moderate pressure. Such an instrument will not penetrate a normal disc. Dandy attaches great importance to mobility of the adjacent vertebræ, demonstrable only at operation by rocking the spinous processes. It is certainly true that some diseased discs do not have posterior protrusions, but the dura and issuing root at that level are intimately adherent to its surface. It is claimed that incision into such a disc and the radical curettage of its contents leads to cure. Dandy does not pay much attention to sensory and motor loss. The only valuable objective finding is a diminution or loss of the ankle reflex, but that occurred in only about half his cases. He relies implicitly on the subjective story which the patient tells, one of backache with pain striking down the leg, usually after a relatively trivial injury such as a lift, bend, or strain. During the acute stages these pains are intensified by coughing and sneezing. Dandy believes that this syndrome (which is essentially the same as that of sciatica in the ordinary medical sense) is so clear cut and so clearly indicative of its origin that it is entirely unnecessary to perform lumbar puncture or to inject contrast media for X-ray studies. He has two objections to the use of lipiodol or the new American preparation, Pantopaque—first, that they may be chemically injurious; but, more important, that they may give negative results even when a ruptured disc is present. New trends in the operation itself are the conservative bone removal which is now employed and the vigorous attack which is made on the disc itself. There is some evidence to show that a very thorough removal of disc material leads to bony fusion. In the United States the operation is sometimes combined with spinal fusion. It is more often done in some clinics than others. The American orthopædists seem to be much more liable to perform spinal fusion than are their English confrères, some of whom believe that many methods which are commonly advocated are pictorially satisfactory but in practice ineffective, and that a proper fusion is a very formidable operation.

R. K. Ghormley, J. G. Love, and J. H. Young² have reported on the 189 patients treated by fusion at the Mayo Clinic. In 62 no disc was present. The result of the combined operation was good in 64 per cent of the patients who had ruptured discs and in 70 per cent of those who had not. They used tibial grafts instead of the more efficient Hibbs's operation. The bone-graft is used when there is spondylolisthesis, sacralization of the 5th lumbar vertebra, or an anomalous neural arch or vertebral body. In some cases judgement as

to the instability of the back is left until the time of operation. The neurosurgeons and orthopædists of the Mayo Clinic work in close collaboration on all cases of low-back pain and sciatica. The tendency at Boston has been to make fewer fusions as time has passed.

For those interested in the subject a useful study of the iodized oil column in contrast radiography has been made by O. R. Hyndman, A. Steindler, and J. Wolkin.³ They agree with Dandy that routine intraspinal injection of radio-opaque substances is not necessary, but say that there are equivocal cases which demand it. These writers did 63 laminectomies and found discs in 50, in one of which the contrast radiogram had been negative. They did not encounter any case in which a hypertrophied ligamentum flavum was compressing a nerve root and they doubt whether this is ever responsible for root pain. Hyndman et al. do not believe that sciatic pain results from spinal arthritis. There is little or no anatomical proof of the compression of nerve roots by the intervertebral foramina in arthritis. Many clinicians still believe that there is such a thing as reflex sciatic pain, as from a fibrositis in the fasciæ of the back. Hyndman et al. agree that this is so, but think that these cases can be distinctively segregated by the use of local anæsthetic injected into trigger points of local tenderness which are usually present on the back, most frequently at the lumbo-sacral junction, posterior superior iliac spine, or gluteal insertion in the same region: 6 to 10 c.c. of a 1 per cent solution of procaine locally injected at once abolishes the sciatic radiation and temporarily restores the ambulatory powers.

It has been objected that the frequent spontaneous remissions or cures of sciatic pain make it inconceivable that many can be caused by a prolapsed disc, which appears to be a fixed unvarying structure. J. E. A. O'Connell⁴ has given the results of his anatomical studies, holding that the physical cause of the pain caused by ruptured discs is the stretching of the fixed extradural portion of the nerve-root over the protrusion rather than its compression between the disc anteriorly and the ligamentum subflavum or lamina posteriorly as many have taught. O'Connell suggests that the root may slip medially or laterally over the dome made by the disc hernia; he explains thus the variables of the often attendant scoliosis and suggests that occasionally a cure may result from the chance adoption by the root of a position favourable to itself. Alternative suggestions of the reasons for cure unassisted by surgery are: (a) subsidence of presumed oedema of the protruded disc material; (b) degeneration of the compressed root; (c) diminution in size of the disc hernia.

Ruptured Discs and Brachial Neuritis.—Although the most common site of rupture of a disc is at either the fourth or fifth lumbar interspace, retropulsions occur at all levels, even in the cervical spine. Many examples of spinal-cord compression are now on record in which a ruptured disc was the cause, the cartilage having pressed on the cord and given rise to a clinical pattern sometimes indistinguishable from that of a cord tumour. A few cases have been observed, not all of them reported as yet, in which the cartilaginous protrusion has been small and so laterally placed as to press upon the issuing nerve-root rather than upon the cord. As will be imagined the result, in the cervical region, is severe pain in the arm which is very naturally diagnosed as brachial neuritis. The essential feature of this pain is that it is uniradicular, that it does not affect the whole arm and every digit in the manner characteristic of some infective neuritides. But judging from the published accounts the pain from a single disc compression may cover a wide area, as is evident from the recent paper by R. E. Semmes and F. Murphey,⁵ who have published a full clinical account of 4 cases (in a footnote they add that a further 7 cases have been seen and 4 of them operated upon). The duration of symptoms varied from 7 years to 3

weeks. Each patient had had attacks of severe pain and stiffness in the neck like fibrositis or muscular rheumatism. The pain radiated to three places: (1) down the lateral and medial surfaces of the arm; (2) to a point just internal to the upper medial scapular angle; (3) to the precordium. The authors actually put the latter site of radiation first, since two of their patients who were doctors had such severe precordial pain that they were convinced that they were having heart attacks and abandoned the idea only when close study proved negative. All the pains were intensified by coughing, sneezing, and straining; the neck was held rigidly during the acute phases. In each patient there was an exquisitely tender point just posterior to the scalenus anticus muscle over the exit of the seventh cervical nerve. It appears that in all of Semmes and Murphey's cases the sixth disc (and the seventh root) was that disordered. In the hand the skin zone chiefly affected was that of the index finger, where there was hyperæsthesia; the digit was weak, especially in flexion. There was no muscle wasting in any patient. Diagnosis was made on the basis of the history and physical signs; iodized oil or other contrast media were not used. The authors believe from what they saw at operation that examinations of the latter sort would have shown nothing abnormal, so far lateral and so small were the cartilage ruptures. Of the 4 cases reported in full, 3 were operated upon (the fourth was recovering spontaneously for the time being), and 2 were completely relieved; the third patient was relieved of the shoulder pain but not entirely of that in the precordium and arm.

The recognition of the fact that some cases of brachial, no less than those of sciatic, neuritis are due to ruptured intervertebral discs goes a long way towards completing the story. It has been objected that the occurrence of brachial neuritis was a proof that neuritis, in the form of a non-pyogenic inflammation of the nerve-sheath and stroma of endoneurium, really existed. The cases just referred to indicate that that argument is a two-edged weapon, that a radiculitis or neuritis limited to one root may very commonly be due to pressure by a sequestrum of disc cartilage regardless of the site of the lesion. The lesion has, none the less, very decided preferential sites, definitely known in the lower part of the spine to be the 5th and 4th lumbar discs (*see Fig. 59, MEDICAL ANNUAL, 1937*), and in the cervical region possibly at the 6th disc, though there are not yet enough verified cases to allow of certainty on this head.

Use of X-ray Contrast Media.—As the diagnosis of ruptured discs by clinical deduction becomes more sure, the necessity for contrast media to outline the suspected region by X rays becomes less imperative. Indeed, as the reader will have observed, some authorities oppose it. Most objections would disappear if some very simple and innocuous means of contrast myelography were available. No rapidly absorbable material opaque to X rays has been discovered. The next best thing is to remove the substance as soon as the pictures have been taken. This is possible with fluid neo-hydriol and with the new American Pantopaque (not yet on the market for civilian use). The technique is this: The patient is placed prone on the X-ray tilting table and a lumbar puncture needle inserted in an interspace higher than the level of the suspected disc, and some 3 c.c. of the opaque medium injected. Experience proves that the puncture is easier in this posture than seems probable. The stilette is replaced and the needle left in place. The patient remains prone whilst the X-ray table is tilted up and down. After the requisite films have been exposed the patient is restored to a position that brings the opaque substance under the lumbar needle, which is then advanced a few millimetres and the neo-hydriol aspirated back into the Record syringe. It is no use trying to do this unless the opaque medium can be easily drawn through a lumbar puncture needle *in vitro*; viscid oils are no use—they may go in under pressure but they certainly will not come

out again. The alternative of oxygen myelography is fairly useful in practised hands, but a lot of cases are needed before sufficient skill can be attained in the reading of the films.

We are at the present in an interim stage in the disc problem; as time goes by it seems likely that myelography will be gradually abandoned unless a spinal tumour is suspected. It is helpful to the novice, but novices ought not to be allowed to touch these cases, which are coming more and more into the special field of the neurosurgeon both in this country and in the U.S.A.

REFERENCES.—¹*J. Amer. med. Ass.* 1942, **120**, 606; ²*Ibid.* 1171; ³*Ibid.* 1943, **121**, 390; ⁴*Brit. J. Surg.* 1943, **30**, 315; ⁵*J. Amer. med. Ass.* 1943, **121**, 1209.

INTESTINAL OBSTRUCTION.

A. Rendle Short, M.D., F.R.C.S.

Treatment by Aspiration.—It is pleasant to find surgical literature from Spain finding its way back into this country. An article by R. Canals Mayner,¹ of Barcelona, relates favourable experience of continuous duodenal and intestinal suction, by the nasal route, for the post-operative treatment of cases of intestinal obstruction or paralytic ileus or acute peritonitis. Similar testimony comes from Buenos Aires, from the pen of J. V. Uriburu.² Aspiration is *not* indicated before operation for strangulation, and if the ileocaecal valve is not patent, surgical treatment is necessary, though aspiration may be used after. According to J. H. Folley,³ of Hanover, New Hampshire, decompression with the Miller-Abbott tube has reduced the mortality from 30 per cent to 10 per cent. "In any intestinal obstruction, the decision is not whether it should be treated medically or surgically, but whether it should be treated medically or surgically at that particular time." This is a decision that must be reached at each visit to the patient. A stylet may be used to assist in passing the tube. The nose is anaesthetized with 2 per cent pontocaine. After passing, the stomach is distended with 200 or 300 c.c. of air, which facilitates the passage into the duodenum. One may tell when this happens by distending the balloon; if it distends without resistance it is still in the stomach. Its passage may be checked by X rays. To keep the patient comfortable, an anaesthetic lubricant for the tube is advised, and hot saline gargles, or throat lozenges, for the throat. The tube must not be fixed by taping or strapping while the balloon is inflated.

Figures from the Presbyterian Hospital, New York, furnished by B. Chew Smith and F. T. van Beuren,⁴ show a mortality for all cases of acute obstruction of 66 per cent in the period 1916–19; 28.4 per cent in 1932–35; 23.8 per cent in 1935–39. The reduction is due to several factors: earlier arrival at hospital; earlier treatment; the relief of dehydration by fluid transfusions; intestinal suction with the Miller-Abbott tube; sulphonamides; spinal anaesthesia. The Miller-Abbott tube was first used in 1937. With the tube in place, high protein fluids can be given. They consider that there is still a place, in a few cases, for enterostomy, by the Witzel technique.

Operative Methods.—O. H. Wangenstein,⁵ of Minneapolis, describes an operation which he calls "aseptic decompressive suction enterotomy". This is useful as a means of reducing the distension of coils of obstructed bowel, so that the exact location and nature of the obstruction can be determined. A length of ileum is stripped to empty it, and intestinal clamps applied. A trocar is thrust into the lumen of the bowel, surrounded by a purse-string suture. A rubber tube is pushed in through the trocar, and suction applied. The tube may be pushed many inches up the bowel, to reduce distension. A few sutures close the incision when decompression is completed.

Volvulus of the Sigmoid.—D. Metheny and H. E. Nichols,⁶ of Seattle, believe that untwisting and reefing of the mesosigmoid is so often followed by recurrence as to be quite unreliable. The best treatment is resection with end-to-end

anastomosis at the same time, with suction through the Miller-Abbott tube to follow. Five successful cases are recorded.

Volvulus of the Cæcum.—L. P. River and F. A. Reed,⁷ of Chicago, report 4 cases. Recurrence is not uncommon. Derotation, with cæcoplexy, is the treatment recommended. D. C. Browne and G. McHardy⁸ write to the same effect.

REFERENCES.—¹*Med. esp.* 1942, 8, 230; ²*Dia. med. Buenos Aires*, 1942, 14, 282; ³*New Engl. J. Med.* 1943, 228, 606; ⁴*Ann. Surg.* 1943, 117, 427; ⁵*Surg. Gynec. Obstet.* 1942, 75, 675; ⁶*Ibid.* 1943, 76, 239; ⁷*Ann. Surg.* 1942, 116, 874; ⁸*Amer. J. digest. Dis.* 1942, 9, 177.

INTESTINAL OBSTRUCTION IN THE NEWBORN.

Str John Fraser, M.Ch., F.R.C.S.Ed.

The relief of congenital intestinal obstruction in the newborn continues to be the subject of investigation and discussion. It is a relatively new field; until comparatively recently cases in this group were regarded as presenting an almost insoluble problem—the uncertainties of diagnosis, the risks attendant upon surgical interference, and the peculiar difficulties of operative technique combined to produce a picture of the most depressing character, so that to many it seemed that surgery offered little or no possibility of relief in this class of case. Credit is due to the few who have refused to accept such a pessimistic attitude, and to-day their courage, persistence, and optimism are bearing fruit, as the literature of the subject records an increasing number of successes in this hitherto apparently hopeless field.

One of the most impressive pieces of evidence of the improvement is recorded in the recent volume, *Abdominal Surgery of Infancy and Childhood*, by W. E. Ladd and R. E. Gross.¹ The section dealing with congenital intestinal obstruction describes a series of 118 cases treated in the Boston Children's Hospital. There were 44 recoveries (37·3 per cent), a figure which twenty years ago would have been regarded as beyond the range of possibility. Each year, as the knowledge of technique improves, the outlook brightens, so that we have reason to look forward to a future of diminishing mortality in this serious congenital anomaly.

Reference may be made to three papers on the subject published during the past year. J. W. Duckett² reports 6 cases, 5 of which were operated on, with 3 recoveries. The conditions represented were congenital stenosis of the third part of the duodenum (1), atresia of the jejunum (3), and congenital mal-rotation of the gut (2) (*Plates XVII–XIX*).

Ward and Cooper³ report an example of congenital atresia of the duodenum successfully treated by duodeno-duodenostomy; Maris and four collaborators⁴ report 4 cases of congenital duodenal obstruction treated successfully by operation combined with the pre- and post-operative use of a metal-tipped gastro-duodenal tube. And so the record grows with an increasing degree of encouragement.

The practical aspects of the position may be summarized as follows. If persistent vomiting occurs in the newborn baby there are three possible explanations—intracranial hæmorrhage, severe body infection, and intestinal obstruction. The first and the second show such special characteristics that their identification is assured, and, if they can be excluded, the possibility of a congenital intestinal obstruction must receive consideration. The diagnosis is confirmed by the persistence and character of the vomit, the absence of meconium in the stool, and the demonstration in a straight radiograph of gas-distended viscera above the level of the lesion.

The diagnosis having been confirmed, no time must be lost in correcting the obstructing error. In cases of intrinsic obstruction the best chance of a favourable outcome is to perform a primary anastomosis above the site or sites of obstruction; two-stage procedures are poorly tolerated. In extrinsic obstruction the procedure implies a reduction of the volvulus and the division of such

PLATE XVII

INTESTINAL OBSTRUCTION IN THE NEWBORN

(J. W. DUCKETT)

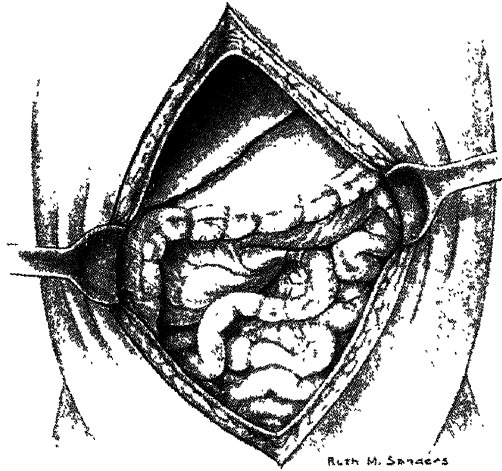


Fig. A.—Stenosis of duodenum near duodeno-jejunal junction.

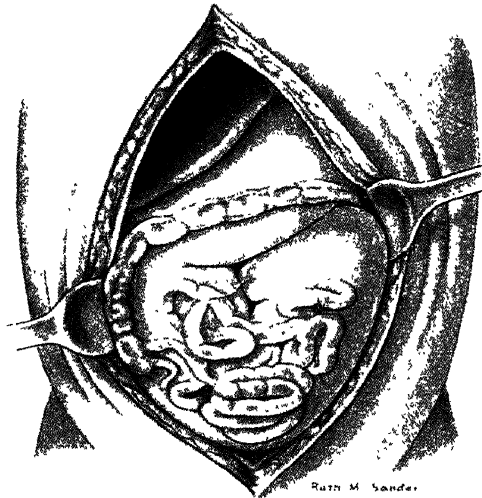


Fig. B.—Atresia of jejunum and abnormal attachment of ascending and transverse colons.

PLATE XVIII

INTESTINAL OBSTRUCTION IN THE NEWBORN—*continued*

(J. W. DUCKETT)

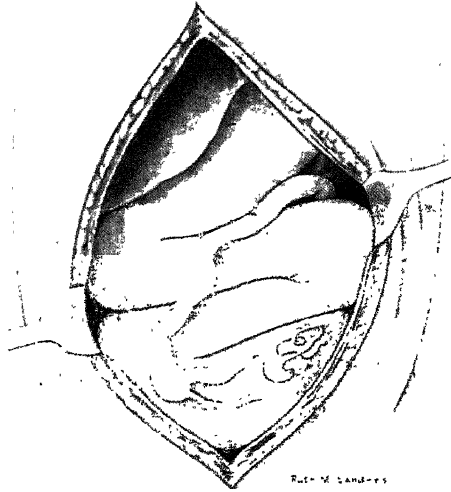


Fig. C.—Atresia and aplasia of jejunum.

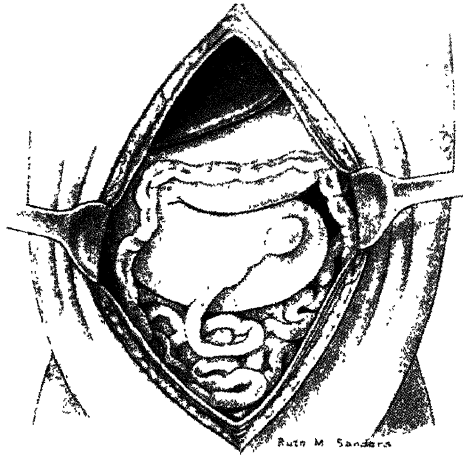


Fig. D.—Atresia of jejunum and aplasia of ileum. Abnormal attachment of ascending and transverse colons.

PLATE XIX

INTESTINAL OBSTRUCTION IN THE NEWBORN—*continued*

(J. W. DUCKETT)

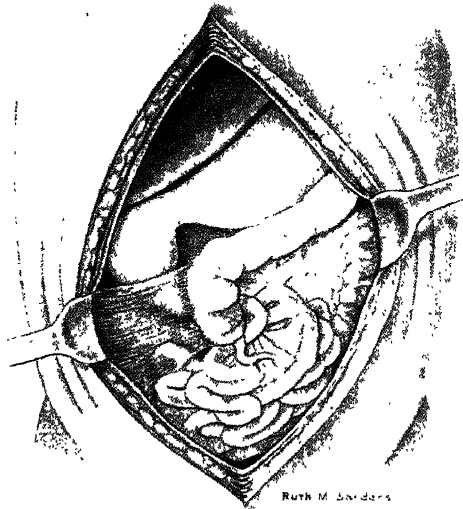


Fig. E.—Malrotation of colon; duodenal obstruction by band.
Volvulus of small intestine.

Plates XVII–XIX reproduced from the ‘Annals of Surgery’

peritoneal bands as may be preventing replacement of the bowel in a correct anatomical position. Maris and his co-workers practised a modification of the procedure in cases of intrinsic obstruction due to the persistence of a diaphragm (Fig. 18). A metal-tipped gastro-duodenal tube is passed into the stomach per os before operation. When the abdomen is opened the metal-tip is identified, and by manipulation through the bowel wall the catheter is guided into the duodenum and along the gut until the point of obstruction is reached. The bowel immediately distal to the obstruction is opened transversely, a pointed artery forceps is introduced, the diaphragm penetrated, and the catheter drawn through the gap into the distal segment; the transverse incision is then closed. The tube is removed before recovery from the anaesthesia takes place. That this method has advantages is evident from the fact that four cases have been treated without fatality. It has of course a restricted field of application; it cannot be employed in a complete atresia, but it seems that the minimum trauma which is implied gives it considerable advantages over anastomosis procedures.

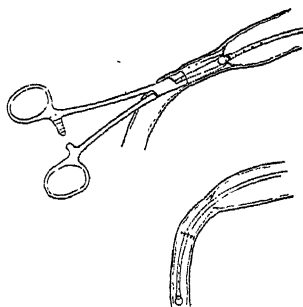


Fig. 18.—Method of destroying duodenal diaphragms. The only opening in the bowel is small, anti-mesenteric, and is placed below the obstruction through normal bowel wall. It is closed transversely.

(Reproduced from the 'Annals of Surgery'.)

There is general agreement upon one point—that whatever the nature of the lesion or the operation required for its correction, close attention must be paid to the details of pre-operative and post-operative procedure, preservation of body heat, gentleness in the handling of tissues, complete hæmostasis, post-operative transfusion with whole blood or concentrated plasma, and the avoidance of vomiting and distension by lavage and suction.

REFERENCES.—¹*Abdominal Surgery of Infancy and Childhood*, Philadelphia, W. B. Saunders Co. 1941; ²*Ann. Surg.* 1942, 116, 321; ³*Ibid.* 1943, 117, 718; ⁴*Ibid.* 348.

INTESTINES, SURGERY OF.

A. Rendle Short, M.D., F.R.C.S.

Intestinal Motility.—According to C. B. Puestow,¹ of Chicago, movements of the small intestine and the colon, both in animals and man, are contrary, the one to the other. He took advantage of observations on a patient in whom both small and large bowel were visible through wounds. When the ileum is active, the colon is quiescent; when the colon contracts, the small bowel is inactive. Those drugs which stimulate the small gut to contract, such as opiates, physostigmine, prostigmine, and acetylcholine, paralyse the colon. Pituitary and pitressin make the colon contract, but inhibit the small intestine. [These observations, if confirmed, are important.—Ed.]

Foreign Bodies.—A visiting surgeon to British prisons, G. O. Chambers,² has recorded his experience of prisoners swallowing foreign bodies. In general, foreign bodies that seem to be doing no harm may be left six weeks before surgical removal is embarked upon. Of 16 cases seen, 8 had perforated; some in the small gut and some in the colon. One patient died. The articles swallowed included spoons, forks, pencils, and needles.

Regional Ileitis.—To the four stages described by Crohn—the acute (simulating appendicitis), the diarrhoeic, the obstructive, and the fistulous—R. Warren and R. H. Miller, of Boston,³ add a fifth, the quiescent. The patients ranged from fourteen to fifty-seven years of age. The greatest aid to diagnosis was the so-called motility intestinal series, in which X-ray plates were taken every hour

after barium. Treatment is unsatisfactory. Of 26 cases resected only 8 were cured. Conservative measures, in early cases, gave good results, but when the disease is well established, operation is necessary, and resection should be offered. Ileocolostomy was less successful than resection. L. Ginzburg and J. H. Garlock,⁴ of New York, consider that the best treatment is short-circuiting by ileo-transversostomy with *exclusion*, by dividing the ileum below the anastomosis and above the lesion. They lost none of 54 patients so treated. It is important to be sure the disease does not extend higher up in the ileum or jejunum. F. H. Lahey and Eric Sanderson,⁵ of Boston, resect the terminal ileum, ascending colon, and hepatic flexure by the Mikulicz technique described elsewhere in this number of the MEDICAL ANNUAL (see COLON, SURGICAL DISEASES OF—CARCINOMA). They had one death in 53 resections, and only 2 recurred in the remaining ileum. There is, however, an acute stage, in which resection is not safe.

An anal abscess or anal fistula, or a mass outside the rectum and pressing upon it, especially in a young adult, should raise a suspicion of regional ileitis and call for a radiological investigation (R. J. Jackman and Newton Smith,⁶ of the Mayo Clinic).

REFERENCES.—¹*J. Amer. med. Ass.* 1942, 120, 903; ²*Brit. med. J.* 1942, 2, 362; ³*New Engl. J. Med.* 1942, 226, 589; ⁴*Ann. Surg.* 1942, 116, 906; ⁵*J. Amer. med. Ass.* 1942, 120, 1356; ⁶*Surg. Gynec. Obstet.* 1943, 76, 444.

INTRAMUSCULAR INJECTIONS.

Lambert Rogers, M.Sc., F.R.C.S.

In 1920 Professor Grey Turner¹ pointed out that the vastus externus muscle was admirably suited for intramuscular injections. This site is less often used than it might be and is to be preferred to the buttock and deltoid regions. The reviewer has seen patients whose sciatic nerves have been damaged as a result of injections into the gluteal muscles, and traumatic aneurysm of the gluteal artery has been recorded from the same cause (M. Paul²). As Grey Turner remarks, the vastus externus site provides a large mass of muscle wall protected by strong fascia and free from important vessels or nerves. Copious injections can be made without causing inconvenience, and, if they must be continued, both sides may be used alternately. The inflammatory troubles sometimes resulting in suppuration, which are occasionally seen after intramuscular injections, are not dependent on the site of the injection but on the nature or condition of the substance injected. Should such untoward sequelæ occur there is no part of the muscular system where they are less likely to do harm than the region of the outer aspect of the thigh. [It is hoped that this site for intramuscular injection will become more widely known and used.—L. C. R.]

REFERENCES.—¹*Lancet*, 1920, 2, 819; ²*Med. Pr.* 1935, 141, 366.

ITCH, CHEESE. (See CHEESE ITCH.)

JAUNDICE, INFECTIVE. (See HEPATITIS, INFECTIVE.)

KERATODERMIA BLENORRHAGICA.

R. M. B. MacKenna, M.A., M.D., F.R.C.P.

This condition was fully discussed by A. M. H. Gray¹ in 1941, and it was obvious then that a good deal of doubt existed as to the gonococcal aetiology of the condition, which had for so long been generally believed.

A. G. Fergusson and F. J. Lees² have suggested that keratoderma blenorragica may be another example of a typical cutaneous eruption, with a characteristic histo-pathological picture, which may arise from various causes. They note that although the epidermis is more involved than in most diseases of the

group known as the exudative dermatoses, nevertheless there is reasonable evidence to suggest that keratoderma blenorrhagica should be included in this group, of which erythema multiforme is a typical example.

It is usually agreed that the *induction of artificial fever* by hyperthermy, or by other means, is the most effective therapy.

REFERENCES.—¹*Med. Annu.* 1941, 219; ²*Brit. J. Derm. Syph.* 1943, 55, 125.

KIDNEY. (*See also* RENAL DISEASES.)

KIDNEYS, SURGERY OF.

Hamilton Bailey, F.R.C.S.

Sterile Pyuria.—That sterile pyuria indicates urinary tuberculosis is almost axiomatic. Nevertheless there is a small group of cases of abacterial pyuria which is definitely non-tuberculous: the reason for the pus in the urine has never been explained. T. Moore¹ reviews the whole literature of the subject in a study of 80 cases of sterile pyuria at Manchester Royal Infirmary. On thorough urological investigation 24 of these proved to be examples of urinary tuberculosis. After eliminating others where there was some definite underlying cause, 5 were found to be examples of true abacterial pyuria, which was first described by Wildbolz and reviewed in the MEDICAL ANNUAL in 1938. This is a very important condition, and Moore has done well in bringing it to the notice of the profession, for in the past when abacterial pus has been demonstrated to be issuing from one kidney, that kidney has often been subjected to nephrectomy unnecessarily. Wildbolz made a remarkable discovery. It was purely empirical, but it is regularly successful. Abacterial pyuria is cured by a few injections of 0.3 g. of novarsenobenzol—a form of treatment which, by the way, is also very beneficial in cases of staphylococcal infections of the urinary tract which have failed to respond to other forms of therapy.

Tuberculous Bacilluria.—Data accumulated over ten years by W. H. Ordway and E. M. Medlar² concerning the presence of tubercle bacilli in the urine of tuberculous patients showed that the presence of tubercle bacilli *per se* is of little significance. The diagnosis of tuberculous kidney must rest on other data: 7.7 per cent of tuberculous patients showed tubercle bacilli in the urine, and of these 77 per cent had no signs of renal tuberculosis.

Renal Tuberculosis.—H. L. Kretschmer³ found that in 26 per cent of cases it was not possible to catheterize the ureter on the diseased side, owing to the presence of cicatrization. He does not agree with the view that patients with renal tuberculosis should have sanatorium treatment for six months before nephrectomy. In the average case treatment before operation should not be prolonged. With the desirability of post-operative sanatorium treatment he is in hearty accord.

Polycystic Kidneys.—These kidneys produce symptoms in one of two age-periods—either in infants, or in adults usually past the second decade. As a result of hæmorrhage, a distended cyst may rupture into the renal pelvis with resulting hæmaturia. The most frequent and earliest symptom is pain. Uræmia, although occurring later than in cases of chronic nephritis, is the most frequent cause of death (J. U. Reaves⁴). T. C. Moss⁵ says the theory advanced by Kampmeier (1923) is gaining in adherents and explains polycystic kidneys and also solitary cysts. K. Y. Yardumian and M. A. Ackerman⁶ also warmly subscribe to Kampmeier's theory,* which is briefly as follows: Commencing with an embryo of six weeks to a foetus of five months, Kampmeier showed histologically that outgrowths of the primitive renal pelvis divide repeatedly to form collecting tubules. Each division is spoken of as a generation of collecting

* Otto F. Kampmeier, contemporary Professor of Anatomy, University of Illinois, U.S.A.

tubules, e.g., 1st generation; 2nd generation. Each collecting tubule is capped by mesoblast, which is the anlage of the glomerulus and the convoluted tubule. The first three or four generations are not permanent, but persist for a short period as cystic structures. Normally they degenerate and disappear. It is the persistence of these provisional structures which give rise to the cysts of polycystic kidneys. If only one cyst fails to degenerate, it gives rise to a solitary cyst of the kidney.

Hydronephrosis.—Hydronephrosis due to stricture of the uretero-pelvic junction or the presence of an aberrant vessel, or both, if discovered early enough, is cured by exposing the region, dividing the aberrant vessel, and in many cases performing a Rammstedt operation on the ureter (O. S. Lowsley⁷).

R. Flynn⁸ states that in his experience aberrant renal vessels are the most general (congenital) cause of hydronephrosis. After good exposure of the uretero-pelvic junction, search should be made for any aberrant vessels crossing

the line of the ureter. If these are small in calibre, they may be divided between ligatures. This procedure should be followed by thorough removal of all adhesions. Frequently this is sufficient to give relief of symptoms, but if the kidney is freely movable the operation could be combined with nephropexy. In the case of large anomalous vessels, division is contra-indicated because of the danger of renal infarction. In this type of hydronephrosis and in cases where the hydronephrotic sac is large, some type of plastic operation is called for.

D. M. Davis⁹ has had very successful results in that difficult group of cases of stricture of the uretero-pelvic junction where the pelvis of the kidney is comparatively small and/or mainly intrarenal. He calls the operation intubated ureterotomy, the steps of which should be quite clear by reference to Fig. 19. [It was D. M. Davis who was

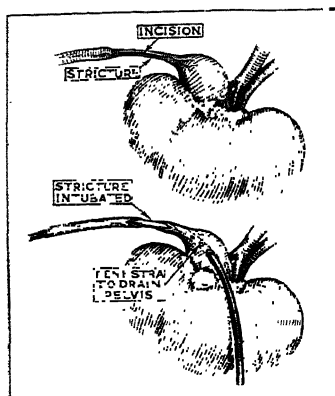


Fig. 19.—Rammstedt's operation with intubation for stricture of the uretero-pelvic junction without gross hydronephrosis. (After Davis.)

the first, or at least one of the first, to apply the principle of Rammstedt's operation for infantile pyloric stenosis to strictures of the ureter. This type of operation is gaining increasing popularity, and if applied to cases in which there is not gross hydronephrosis, lasting results are likely to accrue. When there is a bag-like dilatation of the renal pelvis above the stricture, this principle is inefficient.—H. B.]

T. D. Moore,¹⁰ in a follow-up of his cases, found that in 20 per cent conservative operations on the kidney were unsatisfactory.

Technique in Renal Resection.—O. S. Lowsley⁷ says that if a diseased calix, which usually contains a trapped stone, is not removed it will almost certainly encourage further stone formation. Resection of a polar calix (Fig. 20) is gaining in popularity.

There are also a number of papers this year showing excellent results from heminephrectomy in cases of reduplication of the ureter. E. B. Vickery's¹¹ technique of resection of renal parenchyma is therefore included here. The renal pedicle is held by an assistant to control hæmorrhage (Fig. 21). After sufficient tissue has been removed in a wedge-shaped manner, bleeding vessels are transfixed by sutures placed quite superficially with a small curved atraumatic needle. Releasing pressure on the pedicle from time to time facilitates

the location of bleeding points requiring transfixion. Accurate approximation of cut surfaces is of great importance in the prevention of the dreaded persistent fistula. If there is difficulty in approximating the edges of the wedge, more kidney tissue must be removed.

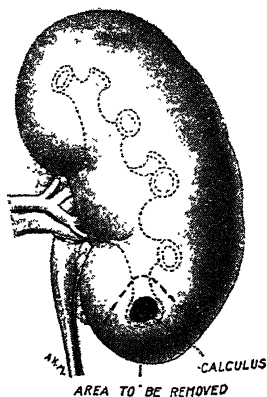


Fig. 20.—Resection of a polar calyx. (After O. S. Lowsley.)

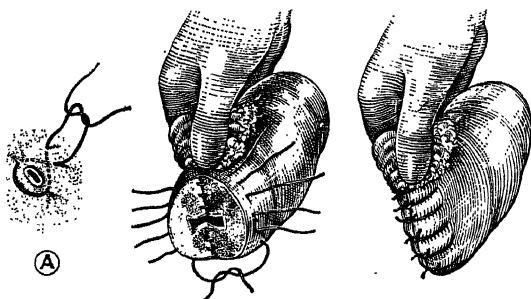


Fig. 21.—The technique of renal resection. The pedicle is held by the assistant. A, Method of under-running a bleeding vessel. (After E. B. Vickery.)

O. S. Lowsley⁷ from experience and experimental data finds that fat is superior to muscle as a hæmostatic agent in the repair of nephrostomy wounds.

Urinary Calculus.—The analysis of urinary calculi has become a subject to which far greater importance should be given if recurrence is to be avoided. A. Randall¹² describes a method of analysing calculi by means of the polarizing microscope, which will interest those who deal with this work.

E. W. Riches¹³ makes a very interesting and practical observation that the addition of calcium to a diet rich in oxalates prevents an increase of the output of oxalates in the urine because they are precipitated as an insoluble calcium salt in the intestine. Therefore rhubarb, strawberries, spinach, and tomatoes can be taken with impunity if accompanied by milk. The chef's idea of serving poached egg with spinach, and cheese with tomatoes, is, therefore, a sound one.

Citrate solutions, rendered less irritating to living tissue by the addition of magnesium, dissolve urinary calculi composed of calcium phosphate, calcium carbonate, and magnesium ammonium phosphate if the solution can be brought in contact with them for a sufficiently long period. H. I. Suby and F. Albright¹⁴ have used this principle in six cases of renal calculi. In four the solution has been introduced through the nephrostomy, and in two through the ureteric catheter. The technical difficulties of getting adequate quantities of the solution in contact with the stone, particularly by the latter route, are discussed. The method is one which should receive attention, but it will be realized that in a number of instances the chemical composition of the stones will be in doubt.

Perinephric Abscess.—Perinephric abscesses are divided by F. A. Simeone¹⁵ into two varieties: (1) 'Simple', where there is metastatic infection via the blood-stream of the perinephric fat; and (2) 'Complicated', where infection reaches the perinephrium from an underlying infective focus in the kidney, e.g., a pyonephrosis or a carbuncle of the kidney. Of 66 cases, 34 were 'simple' and 32 'complicated'.

R. N. Howard¹⁶ also urges the segregation of these two types of perinephric abscess, and when the condition allows, he advises retrograde pycelography and chromocystography to exclude an underlying renal lesion. Deformity of the renal pelvis or definite diminution of renal function on one side indicates a

gross renal lesion. While drainage of the pus is likely to cure cases belonging to the group called 'simple', it is unlikely to do so in the group termed 'complicated'. In desperately ill patients belonging to either group drainage is all that should be accomplished in the first instance, but when the patient's condition warrants it, the opportunity should be taken at the operation to examine the kidney in the 'complicated' group of cases and judgement exercised as to whether the underlying kidney lesion should be dealt with there and then, or deferred to a future date. This is of considerable importance in the case of renal carbuncle.

Typhoid Bacilluria.—The devastating effects of a 'typhoid Mary' in a community are obvious. W. T. Buddington and B. B. Gilman¹⁷ performed nephrectomy on such a carrier with a chronic unilateral typhoid pyelonephritis. As a result of repeated negative cultures following operation, the patient's name was removed from the carrier list of the State of New England.

Renal Function Tests.—T. Findlay et al.¹⁸ found that excretory urography is a good practical renal function test. Normal subjects excrete approximately 45 per cent of the injected dose of the contrast medium in thirty minutes, and reductions in the rates of iodine excretion are roughly proportional to the variations in urea clearance.

K. Kato¹⁹ recommends sodium sulphathiazole clearance as a measure of renal function in children—0.1 g. of sodium sulphathiazole dissolved in 10 c.c. of sterile distilled water injected intravenously. Twenty to 30 per cent should be excreted during the first two hours in a child between the ages of 5 and 14.

Life After Nephrectomy.—In only 7 out of 156 cases of nephrectomy did the patient complain of pain in the remaining kidney, although the impression seems to prevail that this phenomenon is common. In several of these cases in which pain occurred, a pathological condition in the remaining kidney was discovered. In short, if the patient complains of pain in the remaining kidney, one should not assume that the pain is due to compensating hypertrophy. Scoliosis was present in 18 of the patients (H. L. Kretschmer²⁰).

V. J. O'Connor²¹ reviewed a series of 219 cases of nephrectomy performed over 22 years. Apart from recurrence of malignant disease and advanced urinary tuberculosis, there should be normal life expectancy in most instances.

REFERENCES.—¹J. Urol. 1943, 49, 208; ²J. Amer. med. Ass. 1942, 119, 937; ³Surg. Gynec. Obstet. 1942, 75, 704; ⁴Sth. Surg. 1942, 11, 254; ⁵Urol. cutan. Rev. 1943, 47, 142; ⁶Ibid. 147; ⁷J. Urol. 1943, 49, 148; ⁸Med. J. Aust. 1942, 1, 649; ⁹Surg. Gynec. Obstet. 1943, 76, 513; ¹⁰Sth. Med. J. 1942, 35, 425; ¹¹J. Urol. 1943, 49, 137; ¹²Ibid. 1942, 48, 706; ¹³Med. Pr. 1943, 210, 52; ¹⁴New Engl. J. Med. 1943, 228, 81; ¹⁵Arch. Surg. 1942, 45, 424; ¹⁶Aust. N.Z. J. Surg. 1942, 12, 3; ¹⁷New Engl. J. Med. 1942, 227, 400; ¹⁸J. Urol. 1942, 48, 119; ¹⁹J. Pediat. 1942, 20, 576; ²⁰J. Amer. med. Ass. 1943, 121, 473; ²¹Ibid. 1942, 120, 579.

LAURENCE-MOON-BIEDL SYNDROME. *Sir John Fraser, M.Ch., F.R.C.S. Ed.*

The Laurence-Moon-Biedl syndrome presents five cardinal signs—adiposity, retinitis pigmentosa, mental deficiency, hypogenitalism, and polydactyly. There is the associated observation that the disease is a familial one.

The first description of the condition was given by J. Z. Laurence and R. C. Moon¹ in 1866, when they reported the occurrence in the same family of four cases of atypical retinitis pigmentosa, dwarfism, adiposity, hypogenitalism, and mental deficiency. There appears to be no further reference to the disease until 1920, when C. Bardet suggested that the association of errors constituted a clinical syndrome to which the condition of polydactyly should be added. In 1922 B. Biedl added further observations: he recognized the familial tendency, and pointed out the incidence of certain additional malformations—atresia ani and deformities of the skull. A few years later (1925), on the suggestion of S. Solis-Cohen and E. Weiss,² the syndrome was given the names of Laurence, Moon, and Biedl. Since 1920, when the condition may be said to

have been rediscovered, examples have been reported from various parts of the world. Up to 1929, 200 cases had been placed on record.

It is interesting that until 1942 no occurrence of the disease had been noted among the native races of India, but in that year 3 cases were described by P. Kutumbiah and C. Abbu,³ two being Hindu males aged 16 and 14 years respectively, the third a Hindu female aged 13 years. In an article presenting the case-records of these patients the authors provide an interesting review of our present knowledge of the disease. They recall that only a percentage of the cases show the complete syndrome. Obesity is an almost constant feature, retinal pigmentary degeneration and mental deficiency are manifest in 50 per cent of the cases, polydactylism and genital dystrophy show a 50 per cent incidence.

The pathogenesis of the disease remains obscure. It is natural to suppose that pituitary or hypothalamic derangements would be encountered, but none has been found; indeed, the most careful post-mortem examination has thrown no light upon the origin of the disturbance. The theory of origin which receives the greatest credence is that the errors arise from a hereditary genetic defect.

Where the aetiology is so uncertain, treatment must necessarily be empirical and unsatisfactory. Hitherto it has been based upon endocrine therapy, and more particularly a combination of thyroid and pituitary extracts, but the results have not been encouraging.

REFERENCES.—¹*Brit. Ophthalm. Rev.* 1866, 2, 32; ²*Amer. J. med. Sci.* 1925, 169, 489; ³*Indian J. Pediat.* 1942, 35, 121.

LEGAL DECISIONS AND LEGISLATION.

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LEGAL DECISIONS

Evidence before the G.M.C.—This section in last year's MEDICAL ANNUAL contained some account (p. 196) of the case in which a doctor, whose name had been erased by the General Medical Council for committing adultery with a patient, appealed on a novel ground. The Council, he said, ought not to have been content to accept the findings of the Divorce Court, but ought to have allowed him to call evidence, which he had not called at the trial, tending to disprove the adultery. The High Court ruled by a majority of two to one that the council had been right; the Court of Appeal, on the contrary, decided unanimously that the Council ought to have heard the fresh evidence.

The Council has since appealed to the House of Lords. Their Lordships agreed with the Court of Appeal and with Mr. Justice Singleton's minority judgment in the Divisional Court.¹ Viscount Simon, Lord Chancellor, emphasized the distinction which the Medical Act, 1858, s. 29, makes between a case in which a doctor has been convicted before a criminal court, and a case in which he is charged before the Council with infamous conduct in a professional respect. In the former case the Council may erase his name merely on proof of the conviction, and the doctor may not go behind the conviction and try to show that he should have been acquitted by the court. In the latter case the Council is bound to make "due inquiry" before it may erase the doctor's name. The question before the House, therefore, was whether the Council had reached its adverse decision "after due inquiry", when it had refused to hear evidence tendered by the practitioner with a view to showing that he had not been guilty of the infamous conduct alleged, and that the finding of the Divorce Court against him as co-respondent was wrong. Lord Simon remarked that the same problem might arise in the Council after a jury had found that a defendant sued by a

doctor for slandering him had been justified; or after a doctor had had a judgment given against him in an action for seduction, or had had a bastardy order made against him by magistrates. It seemed obvious to his Lordship in these instances that, while the Council might well treat the conclusion reached in the courts as *prima facie* proof of the matter alleged, it must, when making "due inquiry", permit the doctor to challenge the correctness of the conclusion and to call evidence in support of his contention. The previous decision is not between the same parties. The courts may provide the Council with adequate material for its own conclusion if the facts are not challenged before it: but if they are challenged, the Council should hear the challenge and give fitting weight to it.

The same view must, his Lordship thought, be taken if the practitioner challenges the correctness of a finding of adultery by the Divorce Court. If there is to be due inquiry, the doctor must have a fair opportunity of meeting the accusation. This does not mean that the Council has to rehear the whole case by endeavouring to get the previous witnesses to appear before it. The Council would primarily rely on the sworn evidence already given at the trial. In weighing the value of rebutting evidence produced by the doctor, the Council is entitled to bear in mind that this is not given on oath, although it might have been brought forward on oath at the trial, and that the Council cannot compel the attendance of other witnesses who might refute it. The Council is further entitled to attach to the conclusion of the Divorce Court all the weight that is due to the effect upon a trained judicial specialist of sworn testimony given, subject to cross-examination, before a tribunal which can compel the attendance of witnesses and the production of documents. All this, however, does not exonerate the Council from refusing to allow the doctor to put forward the relevant matter in support of his denial.

Lord Atkin added that the statute throws upon the Council alone the duty of holding due inquiry and of judging guilt. They cannot, therefore, rely upon inquiry or a judgment of guilt by another tribunal. They must hear the practitioner and all relevant witnesses and other evidence that he may wish to adduce before them. If this is inconvenient it cannot be helped. Nor did he accept the view put forward on behalf of the Council that they are ill-qualified to form an opinion upon such a charge compared with the High Court judge. He could imagine no tribunal better qualified to draw deductions from the proved conduct between a doctor and his female patients. In accordance with the Council's practice—which would now of course be changed—it had relied for its decision only on the judgment of the Divorce judge, and not on the evidence of adultery given by witnesses. The extracts from the shorthand notes which the Council had before them did not contain any evidence of adultery but related to the absence of doubt in the mind of the judge. The question, however, did not turn upon the judge's absence of doubt, but upon whether the members of the Council were themselves convinced of their fellow-practitioner's guilt. Their Lordships therefore held that the Council's decision to erase Dr. Spackman's name could not stand. The Council may, of course, hold a fresh inquiry into his case, for the rule of the criminal courts that a man may not be twice put in peril does not bind the domestic tribunal.

Almost simultaneously with the decision of the House of Lords in the *Spackman* case, another practitioner appealed unsuccessfully to the Divisional Court against the erasure of his name.² He had been convicted at Kingston-on-Thames of aiding and abetting his wife in making a false declaration in registering a birth. The child was his by another woman, and it was registered as born to him and his wife. The Council erased his name, as it has the power to do when the conviction of a practitioner is proved. His counsel

told the Divisional Court that his client did not regard the false registration as a serious offence: it concerned nobody outside his family circle and was not an offence against society. The Lord Chief Justice, Viscount Caldecote, observed that perjury is a grave crime which shakes the very foundations of justice. False registration of a birth, marriage, or death may draw all sorts of rights and interests into inexplicable confusion. The chief ground of the appeal was, however, that the Council had inquired what was known about the doctor and had heard the evidence of a detective-sergeant. The Divisional Court did not find that this evidence had been, as the doctor pleaded, inadmissible and untrue. In substance it was what the officer had already said in the criminal court and the doctor had apparently not seen fit to question it at the time. The Lord Chief Justice concluded that he was not in a position to contradict any part that would have made any difference to its weight.

Doctor and Coroner.—Though not strictly a legal decision, Mr. Roland Burrows's opinion on the powers of coroners deserves to be treated as one. Not only is Mr. Burrows a King's Counsel and a jurist of high standing, but he is very familiar with medical jurisprudence. Some members of the Medical Defence Union and the London and Counties Medical Protection Society had been asked by their coroner to report all deaths that occurred within 24 hours of an anæsthetic or operation, or before consciousness was fully regained, and deaths occurring within 24 hours of admittance to hospital. Taking exception to this request, they consulted their defence associations, and Mr. Burrows's opinion is an essay on the whole legal relationship between doctor and coroner. His first conclusion will surprise nearly everyone, for he holds that no citizen owes any duty to report a death to the coroner. The text-books all say substantially what *Jervis on Coroners* says: that in all cases of sudden or suspicious death where the duty of informing the coroner is not imposed upon any particular person by statute, it is the duty of those who are about the deceased to give immediate notice to the coroner or the police. The test of a legal duty is, however, whether it can be enforced. The only offence known to the law in these circumstances is that of obstructing a coroner in his duty. To prove such an offence the prosecution must show, first, that the coroner had a duty to hold an inquest; and secondly that the accused did something with the intent to prevent the holding of an inquest. The mere passive failure to report a death is, in Mr. Burrows's opinion, not an offence, but to bury a body unlawfully is one.

By statute, a medical practitioner who has attended the deceased in his last illness and can state the cause of death must issue a certificate in proper form and deliver it to the registrar, who must report to the coroner any death which has occurred in certain specified circumstances. Mr. Burrows concludes, therefore, that in ordinary cases (excluding the special cases of the death of a person of unsound mind, an habitual drunkard, a prisoner, and the like) the doctor need only give a certificate of the cause of death to the best of his information and belief; he has, apart from express statutory provision, no duty to communicate with the coroner.

On post-mortem examinations Mr. Burrows says that apart from an autopsy directed or requested by the coroner, the only examination that can lawfully be made is one under the Anatomy Act, 1832. Such an examination is not a full post-mortem but an anatomical examination, which he understands to mean a full visual examination of all parts of the body. Mr. Burrows unfortunately does not enlarge upon the implications of this remark, which suggests that the universal practice of hospitals is not technically legal. In his published summary,³ however, he says that a practitioner may make a post-mortem examination with the consent of the deceased's relatives whether or not he

knows the cause of death, unless by so doing he knowingly hinders the coroner in carrying out his duties. As soon as a practitioner learns that the coroner has been informed about the death, he should on no account examine the body without instruction from the coroner.

Mr. Burrows also declares that the coroner's powers of attributing negligence are more closely limited than many coroners have recognized in the past. Medical practitioners have often objected strongly to comments made by coroners or juries imputing negligence to medical attendants or hospitals. Mr. Burrows says that where the negligence may amount to manslaughter, the coroner has the duty to pronounce upon the allegation; but in other cases he is not entitled to do so. A coroner's court is not a tribunal to elicit facts on which to found other civil proceedings. It is, however, desirable for such allegations to be met at once; and of course where death is suggested to be the result of negligence it may be difficult in any particular case to say that the negligence does not amount to manslaughter.

The law, therefore, according to the best authority now available, leaves to the citizen's individual conscience in any particular case the decision whether he shall inform the coroner of a death. The medical practitioner is in no different position here from the layman. Mr. Burrows, however, reminds the profession that there are probably many cases in which such information ought to be volunteered. Many practitioners have in the past co-operated willingly with coroners, giving them without close inquiry into strict law such information as might help them. In a statement issued to the press,³ the two associations say that medical practitioners have social, public, and moral obligations, not enforceable by law, to assist coroners. It is important, they declare, that practitioners and coroners should collaborate harmoniously for the public good, and they hope that every practitioner will refer to the coroner any death respecting which he feels any doubt.

Blood-Group Evidence.—The chief problem of the exponents of medico-legal blood-grouping in this country has hitherto been to get blood-group evidence before the court. This evidence is based on the inheritance as Mendelian dominants of a number of serological characters. A child cannot exhibit a group character unless it has existed in the blood of one of its parents. Group tests are therefore able to prove, in a certain proportion of cases, that a given man is not the father of a given child. The bloods of father, mother, and child must be tested. The principal application of the test is in bastardy suits, where a woman asks the court to make an order for weekly payments against a man whom she names as the father of her illegitimate child. As the test is negative—i.e., it can never prove that a named man is the father—it cannot help the woman, and therefore she has no reason to consent to give a sample of her blood except an altruistic willingness to help the court. A Bill to make the hearing of her application conditional upon her consent in appropriate circumstances was introduced in the House of Lords in 1939 and given a second reading, but its further progress was stopped by the outbreak of war.⁴

In spite of the absence of statutory support, blood-group evidence has been heard in several bastardy suits and has more than once exonerated the named man. In addition, a number of prospective applications have been nipped in the bud when the pathologist's report was made known to the parties. Magistrates have on the whole been very receptive to such evidence and have mostly accepted it without question. The very strong, almost dogmatic, opinions in its favour expressed by the members of the Select Committee of the House of Lords⁵ have probably contributed to this attitude. While gratifying to the advocates of blood-grouping, this attitude of the courts was perhaps a shade disquieting to those who felt that scientific evidence should be considered together

with other testimony and not allowed disproportionate weight. A recent observation by Mr. Claud Mullins at the South-West London Police Court may perhaps have a salutary effect. The case was an unusual one, for it was not a bastardy application, but a summons by a wife against her husband for maintenance. The husband's defence was an allegation that a child recently born to the wife was not his and that therefore she had committed adultery. They had been living apart but he had visited her from time to time. He was not allowed, by the rule in *Russell v. Russell*,⁶ to give evidence that he had not visited her at any particular time. He did not name any other man as the father, and his sole evidence of adultery was the result of a blood-group test, performed by Dr. David Harley, which showed that his group was OM, the wife's AM, and the baby's AMN. The baby therefore had an N factor unaccounted for by either of his presumed parents. On the other hand, the wife's demeanour as a witness strongly supported her denial of adultery. Mr. Mullins was at first inclined to the view that Dr. Harley's evidence over-rode other considerations; but after the husband had been closely cross-examined and the wife's sister had given evidence that he had visited the wife about the time when the child must have been conceived, Mr. Mullins declared that he would not bastardize the child on the blood test alone. The husband thereupon offered his wife a home and maintenance and accepted the child as his own. She accepted the offer and withdrew her summons.

Evidence of Medical Negligence.—Nearly twenty years ago a general practitioner had the misfortune, when attending a woman in confinement, to tear out her uterus after the child was born. She died, and he was charged with manslaughter. In summing up, Lord Hewart, Lord Chief Justice, laid down⁷ that a doctor is not criminally responsible for a patient's death unless his negligence or incompetence passed beyond a mere matter of compensation between citizens and showed such disregard for life and safety as to amount to a crime against the State. No notable case on criminal negligence by a medical man was reported after that until the appeal of Dr. Akerele last year⁸ from a judgment of the West African Court of Appeal. The doctor, touring the Owerri province of Nigeria in May, 1940, treated a number of inhabitants from the villages of Asaga and Akanu. No ill effects were reported from Akanu, but of 57 children treated at Asaga with sobita (sodium bismuth tartrate B.P.) for yaws, ten died. The doctor was charged before an assistant judge of the High Court of the division with the manslaughter and negligent treatment of one of the children, Kalu Ibe.

The doctor did not dispute that the boy's death was due to bismuth poisoning. He said he used to dissolve the powder for the day's work in sterile water and carry the solution in a 20-oz. bottle. When he heard of the illness of the children he came back to the village, provided mouthwash and milk at his own expense, and tried unsuccessfully to get an assistant to continue the treatment. The assistant judge found the doctor guilty of manslaughter and of negligence in administering medicine, and sentenced him to three years' hard labour, and a fine of £100 or 12 months' hard labour. The West African Court of Appeal quashed the sentence on the negligence charge, and varied the sentence on the manslaughter charge to a fine of £500. The doctor's name was struck off the local medical register. He appealed to the Judicial Committee of the Privy Council.

The board which heard the appeal considered it unfortunate that the medical witnesses called for the Crown had had little if any practical experience of sobita, so that the court had no information on what excess of strength in the mixture would be required to produce the observed consequences in a normal patient, nor how widespread amongst the medical profession is or ought to be the knowledge of the danger of an overdose. The trial judge had remarked that evidently the dissolving of the powder did not involve any particular technical finesse,

but that the doctor had managed in giving the injections to make at least eleven persons gravely ill with symptoms of the most revolting order. The board considered that if the only negligence on which the Crown could rely was the single act of dissolving the powder in water, it was immaterial that the symptoms were revolting or that the result was to make many persons ill. The act had already taken place, and its later consequences could not add to its criminality. The negligence to be imputed to a person depends upon the probable, not the actual, result. It was unfortunate, they thought, that the judge nowhere stated in what he found the negligence to consist unless in its fatal consequences to so large a number of persons. He seemed to have thought that, whereas one death might have been due to inadvertence, ten could not, and to have forgotten that one act only could be complained of—the mixing of too strong a solution. He had imputed to the doctor repeated acts of negligence as if the doctor were to be blamed for want of care at each injection, instead of for the one act of carelessness in preparing the mixture to be injected. Moreover, the judge, so far from considering whether gross negligence had to be proved, appeared to think it enough if the doctor did not make as certain as was humanly possible that he injected the correct doses. The board could not accept the view that criminal negligence had been proved merely because a number of persons had been made gravely ill after receiving an injection of sobita from the appellant, coupled with a finding that a high degree of care had not been exercised. They did not think that, merely because too strong a mixture was once dispensed and a number of persons were made gravely ill, a criminal degree of negligence was proved. The Nigerian Court of Appeal had not, in the board's view, considered whether the judge had sufficiently directed his mind to an analysis of the acts said to constitute a felony, and to the degree of care required of a professional man against whom a criminal charge is preferred. In their view the distinction between civil and criminal liability had been inexactly drawn, the ground upon which the criminal charge was based had been ill-defined, and the instances of negligence had been increased from one to many by imputing a fresh act of negligence for each death. They therefore advised the King to quash the conviction.

'Agreed' Medical Reports.—Opinions differ about whether, in preparing a legal action involving medical evidence, the doctors on each side should be encouraged to agree on the evidence they will give to the court. (Cf. *MEDICAL ANNUAL*, 1942, p. 208.) The practice of the court is to make, in suitable cases, an order that the medical evidence shall be agreed if possible, and that, failing agreement, it shall be limited to two witnesses on each side. The real object of this practice seems, however, to have slipped somewhat out of sight, and the order came to mean merely that each report should be accepted as the evidence of the doctor who made it. The Court of Appeal has restored the position.⁹ A woman suffered an injury to her foot through the action of a servant of the local authority, whom she sued for negligence. The customary order was made; each side put in a report by its doctor, and the patient, having received the report of the corporation's doctor, submitted to another examination by another doctor. His report was put in, and the solicitors for the parties purported to agree these three reports, which went before the court as medical reports agreed pursuant to the order. When, however, the reports were examined, they disclosed important gaps in information and were substantially inconsistent with one another. One gap which the trial judge considered to be important concerned treatment. He was much impressed to learn that no physical treatment, such as electrotherapy or massage, had been ordered for the plaintiff. He took the view that she could have gone back to work very much earlier than she had, and gave her relatively small damages.

The Court of Appeal strongly criticized the practice which had made the medical evidence so inadequate. Lord Greene, Master of the Rolls, remarked that if a judge is confronted with two or more medical reports which are inconsistent with one another and the doctors are not called, he is immediately placed in the position of having to select between the two views and the two statements. The whole object of this type of order is, his Lordship said, to ensure that matters of medical fact and opinion shall, if possible, be agreed by the medical men. The practice was certainly never intended to allow inconsistent and differing medical points of view to be put before the judge and described as "agreed medical reports" when they are nothing of the kind. The phrase means only a report where the facts stated are agreed as true medical facts and the medical opinions are accepted as correct. In the normal case, in pursuance of an order of this kind the doctors on the two sides should meet and embody their views in a document which they can both sign. That is very convenient, and in many cases would save a great deal of trouble and expense; but orders of this kind are not to be made as matters of course. Whether such an order should be made will depend very much on the nature of the case and on the injuries, and whether it will save trouble and expense in the long run by dispensing with the doctors at the hearing. In future the order should refer, not to "medical reports", but to "a medical report". That does not mean that, where there are two types of injury each of which is dealt with by specialists, there should not be two agreed medical reports, one made by one pair of specialists and the other by another, each dealing with its own province. Where, however, doctors are dealing with the same symptoms in one diagnosis, that should be embodied in one medical report. The practice of making orders allowing a number of such reports, each dealing with the same subject-matter, must cease.

The trial judge was wrong, said the Master of the Rolls, in drawing the inference he did from some assumed medical practice which he might have come across in other cases. He was not entitled to assume, in the absence of evidence, that any such physical treatment would have been suitable on the facts of the present case. If the doctors had been in court, they might well have said unanimously that in this class of sprain, serious or not serious, treatment of that kind was of no use. The judge, however, drew upon some store of medical knowledge of his own, and his medical view greatly influenced his assessment of the seriousness of the injury. The medical evidence, even of the corporation's doctor, showed a permanent and serious physical affection. The patient had to wear special shoes for the rest of her life, and was obviously suffering from some disability that might prevent her from earning wages in other types of work. The Court of Appeal therefore trebled the damages awarded by the trial judge.

Medical Certificates in Court.—The Court of Appeal upheld¹⁰ the validity of a medical certificate showing that a litigant was too ill to attend court. The patient was defending an action in the county court for the recovery of a debt, and his own evidence was important. On the second day of the hearing, when he was to have testified, his counsel produced two medical certificates stating that he was ill with bronchitis, and asked for an adjournment. The judge refused, and decided the case against him in his absence. The truth of the certificates was not questioned, but the judge took the view that they should have been supported by affidavit. A judge decides such questions of practice according to the discretion given him by statute, and his exercise of this discretion can only be criticized by the Court of Appeal if he has made an error of law. Lord Justice Scott thought the judge had done so in this case. His Lordship said that if a judge in such circumstances is satisfied of the medical fact and the importance of the evidence, he should give an adjournment, perhaps

on terms, unless an injustice would be done to the other side which could not be reduced by costs. The absence of an affidavit was, he thought, a wholly inadequate reason for depriving a defendant of a hearing. The Evidence Act, 1938, s. 1 (5), says that in deciding whether or not a person is fit to attend as a witness, the court may act on a certificate purporting to be the certificate of a registered medical practitioner; and the judge ought to have accepted these certificates. Mr. Justice Croom-Johnson agreed, but Lord Justice du Parcq found himself in a minority, considering that the judge's error, if any, was one of fact and so not subject to appeal: viz., he found that the allegation that the defendant was ill and unable to attend was not proved. It is comforting to be reminded that the doctor's word is to be considered, in the absence of some good reason to the contrary, as equivalent to his bond.

Police Decoys in Medical Practice.—Great indignation was aroused in the medical profession and also among the general public by the action of the Public Prosecutor and the police against a medical practitioner.¹¹ Three men were coached by the police to act the part of patients asking for certificates to exempt them from work in a war factory. They told the doctor carefully-fabricated stories and induced him to give them certificates. He was then arrested and charged with false certification. He was defended by The Medical Defence Union, which, feeling that the time had come to expose such attempts to trick doctors, arranged for him to be represented by leading counsel.

One of the decoys told the doctor that he had been in bed two days with influenza, had pains in his head, and felt hot. The doctor found his temperature to be 99° and his pulse 100; he told him to go to bed and prescribed a stock mixture. One of the other men had been sent previously but had failed to get a certificate; perhaps, as *The Lancet* suggests, practice had made him a better actor. Mr. Daniel Hopkin, the North London magistrate, said that these methods were quite alien to the spirit of British law and ought to be condemned. He found that the doctor had reasonable cause to believe that the certificates were given in good faith. The detective-sergeant, of Scotland Yard, agreed that the term *agent provocateur* could be properly applied to each of the three men. The magistrate dismissed the charges and awarded 10 guineas costs against the Director of Public Prosecutions.

When the matter was raised in the House, the Under Secretary for the Home Office, Mr. Peake, explained that the limits within which the police were justified in giving opportunities to a person to commit an offence in order to obtain evidence against him are set out in the report of the Royal Commission on police powers and duties. The Commission recognized that in certain types of cases the police cannot enforce the law without such methods. The police are, he said, well aware that the courts will always scrutinize most narrowly the evidence of any witness who can be represented as having encouraged or procured an offence which would not otherwise have been committed. He could not see anything in this case which need cause anxiety to a doctor who accepts in good faith a statement made to him by one of his patients. He thought there was a clear distinction, well understood by the police, between incitement to commit an offence, which is wholly wrong, and the employment of subterfuges to obtain evidence where habitual offences are reasonably suspected and no other methods are available.

This reply has been considered by the profession profoundly unsatisfactory. The worst feature of the affair from the medical point of view is that if such tricks became general, the doctor would constantly have to consider whether he could trust the word of a new patient.

The Encephalograph and Criminal Responsibility.—A youth charged at the Old Bailey in March last year with murdering his mother attempted to prove

by encephalograph readings that he was not responsible for his crime by reason of mental deficiency.¹²

Two doctors, giving evidence for the defence, said that he suffered from a congenital constitutional defect of development manifesting itself in emotional immaturity, poor physique, and minor abnormalities of the central nervous system. He did not, they said, necessarily suffer from epilepsy, but rather from psychopathic personality. Before killing his mother he had drunk four pints of mild beer. They accordingly gave him this quantity of beer before testing him, and observed that his blood-sugar was lowered and his abnormality became aggravated. When the blood-sugar was reduced, the electrical impulses from his brain were erratic and definitely abnormal; his judgment was impaired and his full perception of events was distorted. The medical witnesses concluded, in terms of the *McNaghten* rules, that he had known what he was doing and that it was wrong, but that his brain was functioning abnormally so that he was unable fully to appreciate the nature of his act. These rules are just 100 years old, and are a legal curiosity in not having been laid down in the decision of a case, but having been reluctantly formulated by the judges in answer to questions put to them by the House of Lords. They state, among other things, that to establish a plea of insanity the accused must prove clearly that at the time of committing the act he was labouring under such a defect of reason from disease of the mind as not to know the nature and quality of the act he was doing, or, if he did know it, not to know that he was doing wrong. There is no room for the defence that, although the prisoner knew he was doing something wrong, he was so insane that he could not help doing it—the defence of “irresistible impulse”, as it is often called. Psychiatrists are familiar with insane persons who retain some sort of moral judgment but whom no reasonable person would call responsible for their violent acts. The trial judge clearly explained the *McNaghten* rules to the jury, and said he could not advise them that the rules applied. Nevertheless, the jury found the prisoner “guilty but insane at the time”. It is a pity that the law should require to be handled so roughly in order that justice may be done.

Ownership of an X-ray Film.—The question of who owns an X-ray film has never been decided in this country, and does not seem ever to have come before the High Court. The view which seems nearest to the truth is that when a patient is examined by a radiologist and no particular conditions are settled, he agrees to pay a fee and the radiologist agrees to examine him and to make an adequate report. Films are generally necessary to illustrate the report; but the radiologist does not agree, in exchange for the fee, to provide the patient with a set of films for use as souvenirs or even as information to some later medical adviser. The patient probably pays for the use of the films in certain ways—to inform the practitioners treating him at the time, and even perhaps at some time in the future—but the ownership of the film itself remains with the radiologist. That view is based upon the ordinary facts of radiological practice. The father of a patient recently, however, went so far as to plead¹³ that he had refused to pay a radiologist's fees because he had not received the radiograph. The boy's general practitioner had arranged that the radiologist should make a film of the cervical spine. The radiologist sent the film next day to the general practitioner with his report, and sent in his account to the father. It remained unpaid for a year, after which he sent a reminder, and the father replied that the radiologist had undertaken to provide him with an X-ray photograph and a written report and had failed to perform his contract. The radiologist answered that in accordance with professional custom he had sent the films and the report to the general practitioner, who would doubtless be willing to pass them on to the father. Receiving no reply, he took proceedings.

The judge gave judgment for the fee on the ground that the radiologist had done the work, and expressed some sympathy with the father, who knew that the photographs had been taken and the reports made but was not able himself to see them. The newspaper report of the case, however, does not state that the father had ever asked for them.

Nagging as Legal Cruelty.—Until the passing of the Matrimonial Causes Act, 1937, cruelty was merely a ground for judicial separation—for keeping husband and wife apart. By “Herbert’s Act” it has become a ground for divorce. The quality of cruelty in law has, however, remained the same: the defaulting spouse has been guilty of deliberate behaviour of which the effect either has been, or must in the ordinary course be, to injure the bodily or mental health of the other spouse. Mr. Justice Henn Collins heard a case¹⁴ in which a husband asked for a divorce on the ground that his wife had constantly nagged him more and more frequently with the passing of the years and with increasing lack of self-respect. The only apparent explanation of her conduct was that she was jealous of the time he spent away from her. He proved by evidence that she would sometimes continue her upbraiding until three or four o’clock in the morning, and that as a result of this constant nagging his health was affected. The judge said that in the early history in the Divorce Court of matrimonial disputes founded on cruelty, suits by husbands were a great deal less common than suits by wives. This might have had many reasons. Formerly public opinion permitted the use of the ducking-stool, and long after that went out of use the husband could, without censure of his neighbours, exercise a far stricter discipline—even a physical discipline—than would be tolerated to-day. These facts did not make him less but rather more entitled to the protection of the court. Violence is not necessary to constitute cruelty. Constant nagging may become completely intolerable. Dropping water wears away a stone, and nagging which never amounts to what is commonly called a “row” may yet be of such a kind and so constant that it endangers the health of the victim. Then the court intervenes for the protection of the person. The judge was satisfied that the husband had proved cruelty, and granted him a decree *nisi*.

Fecundation *ab extra*.—One of the grounds on which a marriage can be annulled is the failure of one or both of the parties to consummate it by sexual intercourse. If a child has been born, non-consummation is naturally very difficult to prove. This difficulty was, however, overcome by the husband in the case of *Clarke v. Clarke*.¹⁵ The parties were married in 1926 at the ages of 26 and 24, and in 1930 the wife gave birth to a son of whom the husband was without any doubt the father. Mr. Justice Pilcher said that the question whether the marriage was ever consummated was entirely one of fact. There is always a presumption of consummation, especially strong when a child has been born. Medical evidence was brought to show that fecundation is possible without penetration, but the courts have for some time been familiar with cases of this type, and accept fecundation *ab extra*, although very unusual, as a medical fact. The judge believed the evidence of both husband and wife that no penetration had ever been effected, and pronounced decree of nullity. The judgment deals fairly fully with the medical evidence, and gynaecologists will find it useful and interesting.

LEGISLATION

The Nurses Act.—In addition to nurses registered under the Nurses Registration Act, 1919, a large class of unofficial nurses has grown up. By the spring of 1943 more than 16,000 women holding no nursing qualifications were employed throughout the country, especially in hospitals treating the chronic sick and infirm.¹⁶ The demand for nurses grows every year, and the services of these women could not possibly be dispensed with. To meet the situation, Parliament

passed the Nurses Act, 1943. The General Nursing Council has now to keep, in addition to the register, a roll of "assistant nurses". It may make rules for admittance to the roll, erasure from it, and other relevant purposes, but before admission the candidate must have undergone the prescribed training and acquired the prescribed experience. Existing assistant nurses may be enrolled on producing evidence of good character, of *bona fide* practice under satisfactory conditions, and of sufficient knowledge and experience. All matters concerning assistant nurses are dealt with by a special committee consisting of six nominees of the council and five representatives of assistant nurses appointed by the Minister. Existing assistant nurses pay a guinea on application for enrolment, and the yearly charge for retention on the roll is half-a-crown. Appeal against removal lies to the High Court.

The use of the title of "nurse" is for the first time restricted. Any person who is not duly registered or duly enrolled is forbidden to call herself a nurse, whether she uses the word by itself or in combination with other words or letters. The children's nurse, however, is exempt, and the Minister may authorize the use of the name by specified classes of persons. The Act also regulates the conduct of agencies for the supply of nurses. These may supply only registered nurses, enrolled assistant nurses, certified midwives, and other prescribed classes of persons. When supplying a nurse, the manager must give the client a statement of her qualifications in writing, and the selection of the nurse supplied must be made by or under the supervision of a registered nurse or medical practitioner. Agencies must hold a licence from the local authority, which has the usual powers of refusal or revocation of licence. Proper records have to be kept. The Bill had an easy passage, and obviously attracted general approval. The practice of nursing by the unregistered or unenrolled is not forbidden, but is obviously now so difficult that nursing has practically been made a closed profession.

Venereal Diseases in Wartime.—The alarming increase in venereal disease, more particularly in the armed forces, has caused great anxiety to the military commanders. The Government, always reluctant to legislate on this delicate matter, at length introduced Defence Regulation 33B.¹⁷ At first sight this regulation seems a very modest one and not likely to have any appreciable effect on the incidence of venereal disease. It recognizes a class of "special practitioners" in these diseases and imposes on them certain duties. When a patient gives a special practitioner information concerning the person from whom he suspects he caught his disease, and the practitioner does not think the story inherently improbable, he must notify the medical officer of health, in a form laid down by rule,¹⁸ of the identity of the patient and of the "contact"—the suspected source. Such information must be kept secret. If the medical officer of health receives a form showing that the same contact has been indicated by a second patient, he must serve notice on her (the contact is usually a woman) to attend and submit for examination by a special practitioner. If the practitioner finds that she has communicable disease, he must serve her with a notice to attend for treatment until he is able to issue a clearance certificate. She may choose her special practitioner, and may transfer to another at will.

The regulation has been widely criticized and has received relatively little support. The chief criticism is that it does not go nearly far enough. Other grounds of objection are that patients will withhold information rather than be notified, and that the secrecy is not inviolable, nor the protection of patients against slander actions by contacts sufficient (information given under 33B is covered by qualified privilege). The real value of the regulation seems, however, to lie in what it does not say. The Minister of Health admitted in the House last autumn that the number of contacts who had been served with notice was

relatively insignificant, but he added that about 1900 persons, most of whom had only been indicated by one patient, had been induced to undertake treatment. The practice in a growing number of areas is for the medical officer of health, on receiving notice that a patient suspects a certain person, to send a health visitor to see the suspect and point out the urgent need to come and be properly treated. In practice, most women approached in this way are only too eager to accept help. The obstinate are very rare, the vindictive rarer still. Much has been made of the bog of false accusation; but when a suspect is not really a promiscuous person the falsehood is very soon obvious. Everyone concerned, from the Minister downward, takes the greatest pains, and is officially instructed to do so, to administer the regulation with tact and delicacy. By facilitating the "unofficial approach", 33B may do much more good by stealth than it appears capable of doing openly. The number of persons prosecuted under it has not yet exhausted the fingers of two hands. An exhaustive commentary on it has been published by Mr. N. P. Shannon,¹⁹ of counsel.

REFERENCES.—¹1943, A.C. 627; ²*Lancet*, 1943, 2, 236; ³*Brit. med. J.* 1943, 2, 694; ⁴*Med. Annu.* 1940, 294; ⁵1939, No. 173; ⁶1924, A.C. 687; ⁷*R. v. Bateman*, 1925, 94 L.J.K.B. 791; ⁸*Akerele v. R.*, 1943, A.C. 25; ⁹*Harrison v. Liverpool Corporation*, 1943, 2 All E.R. 449; ¹⁰*Dick v. Piller*, 1943, K.B. 497; ¹¹*Lancet*, 1943, 2, 682; *Brit. med. J.* 1943, 2, 719; ¹²*Lancet* 1943, 1, 414; *Brit. med. J.* 1943, 1, 607; ¹³*Fothergill v. Robson*, *Lancet*, 1943, 1, 658; ¹⁴*Atkins v. Atkins*, 1942, 2 All E.R. 637; ¹⁵1943, P. 1; ¹⁶*Lancet*, 1943, 1, 439; ¹⁷*S.R. & O.* 1942, No. 2277; ¹⁸*Ibid.* No. 2356; ¹⁹*Brit. J. vener. Dis.* 1943, 19, 22, 67.

LEISHMANIASIS. *Sir Philip Manson-Bahr, C.M.G., D.S.O., M.D., F.R.C.P.*

Stilbamidine : Increase in Toxicity on Exposure to Light.—A number of deaths have occurred in the Sudan after the use of stilbamidine in the treatment of leishmaniasis. J. D. Fulton and W. Yorke¹ have investigated this point and have found that solutions of stilbamidine which had been exposed to light increased in toxicity for mice, whereas solutions kept in the dark remained unchanged. H. J. Barber, R. Slack, and R. Wien² found that dilute solutions of stilbamidine (0.5 per cent) exposed to sunlight increased in toxicity four- to five-fold in about four days after which there was no appreciable further increase. Weak solutions changed much more rapidly than did stronger ones, and by subjecting 10 per cent solutions to light from a mercury arc, quantities of toxic solution for isolation of the material responsible for this toxicity were obtained. It is now believed that the toxic product is 4-4'-diamidino-phenyl-benzyl-carbinol. It is probable that this reaction occurs in aqueous solution. In general the pharmacological effects shown by the toxic product differed quantitatively rather than qualitatively from those of the original substance. The isolated product had a toxicity in mice five times greater on intravenous injection and ten times greater on subcutaneous injection than that of stilbamidine. It is important to note that the toxic product was almost inactive therapeutically against *Trypanosoma equiperdum*.

REFERENCE.—¹*Ann. trop. med. Parasit.* 1942, 36, 134; ²*Nature*, Lond. 1943, 151, 107.

LEPTOSPIROSIS (Weil's Disease).

Sir Philip Manson-Bahr, C.M.G., D.S.O., M.D., F.R.C.P.

Jaundice is fairly common in Nigeria, for the years 1938-1940 indicate that 2162 cases were treated at the various Government hospitals during that period—an annual incidence of 0.036 cases per 1000 population. Of these cases 152 were classified as cholecystitis, 40 as yellow fever, and the remainder as catarrhal jaundice, but only a very small proportion came from those centres where complete laboratory investigation was possible. Leptospirosis has been reported several times in Central and West Africa, especially from the French and Belgian Congos and from French West Africa, as well as from the Canary Islands.

The case reported by J. I. Lesh and D. A. Cannon¹ came from Oyo Province, Southern Nigeria. The case, in an African negro of 26, was sudden in onset, the patient complaining of severe backache and headache with epistaxis and mæna. Subsequently there was jaundice and bile in the urine, which also contained hyaline and granular casts. Serum was negative to the mouse-protection test (yellow fever), but using the technique of Schüffner and Mochtar with a living culture of *Leptospira icterohæmorrhagiae* it was positive in a titre of 1-1000. Some confirmatory evidence was obtained by the fact that the patient had previously bathed in a small river and that infected rats are probably widely distributed in the bush. The difficulty in differential diagnosis of these various forms of jaundice under primitive conditions in West Africa may be readily appreciated.

REFERENCE.—¹*Trans. R. Soc. trop. Med. Hyg.* 1943, 37, 89.

LEPTOSPIROSIS IN BRITAIN.

Ralph M. F. Picken, M.B., Ch.B., B.Sc., D.P.H.

A. D. Gardner¹ has examined sera for agglutination of *L. icterohæmorrhagiae* from about 350 patients from various parts of Great Britain during the 4 years ended February, 1943. Of these, 58 gave positive reactions, and were diagnosed as probably or certainly Weil's disease. In the well-developed disease agglutination may occur in dilutions as high as 1 in 10,000 or even 1 in 30,000; reactions at 1 in 25 or even 1 in 100 cannot be regarded as diagnostic. Of the 58 cases 21 occurred in the South Wales mining areas. The others were widely dispersed throughout England and Wales. The occupations or circumstances associated with infection were as follows :—

Miners, pitworkers	12
Farmers, ditchers, crofters, stablemen ..	8
Bathing or accidental immersion	5
Sewage workers	4
Soldiers, exposed to sewage, rats, or wet ..	4
Soldiers, no history	4
Fishdealer (1), dairyman (1), butcher (1)	3
Builder's labourer (1), pumpman (1) ..	2
Dentist; cleaned out pig-sump	1
Unknown	15
	<hr/> 58

In the last group there were 3 adult females and 3 whose sex was unknown; 1 female child, age 4 years, was infected by immersion; all the other cases were adult males. The butcher had been bitten by a rat.

Probably these 58 cases are only a fraction of the real incidence. Jaundice occurs in only 60 per cent of cases, and blood examination is not always made even when jaundice occurs. Serum tests should be made on all patients exposed to special risk who develop headache, muscular pains, conjunctivitis, and intestinal irritation, without waiting for jaundice to develop.

REFERENCE.—¹*Emerg. publ. Hlth. Lab. Serv., Mon. Bull.* 1943, 2, 40.

LEUKÆMIA : RENAL COMPLICATIONS. Stanley Davidson, M.D., F.R.C.P. H. W. Fullerton, M.D., M.R.C.P.

D. Merrill and H. Jackson, jun.,¹ draw attention to the frequency of renal failure in leukæmia. Analysis of a small series of 18 cases showed that this complication occurred before death in 10. The main causes were nephrolithiasis, leukæmic infiltration of the kidneys, and obstruction of the renal blood-vessels or ureters by leukæmic tissue. These renal stones are mainly composed of uric acid, and are particularly liable to occur during or after X-ray therapy,

when the excretion of uric acid is much increased as a result of rapid destruction of large numbers of leukæmic cells. In view of this it is of interest to recall that gout is a rare complication of leukæmia, and when it does occur it is probably coincidental and not dependent on the rapid production of endogenous uric acid.

REFERENCE.—¹*New Engl. J. Med.* 1943, **228**, 271.

LIVER, AMOEBIC ABSCESS OF. (See AMOEBIASIS.)

LIVER, CIRRHOSIS OF.

A. Rendle Short, M.D., F.R.C.S.

An occasional and very dangerous complication of this disease is *profuse hæmatemesis from œsophageal varices*. E. J. Grace, of Brooklyn,¹ relates a successful case treated by ligation of the coronary vein and injection of sodium morrhuate. The patient was a typical cirrhotic, with cachexia and a swollen abdomen; he had had four serious attacks of hæmatemesis. The abdomen was opened, the very dilated coronary vein tied with black silk, and 8 c.c. of sodium morrhuate solution injected. The liver was cirrhotic. A month later, omentopexy was performed. There were two small attacks of vomiting of blood, then great improvement took place; the bleeding ceased, and the ascites cleared up.

REFERENCE.—¹*Ann. Surg.* 1942, **116**, 387.

LIVER EFFICIENCY TESTS.

Sir Henry Tidy, M.D., F.R.C.P.

J. G. Allen¹ (Illinois) publishes a review of the literature on the diagnostic value of *prothrombin response to vitamin K* therapy as a means of differentiating between intrahepatic and obstructive jaundice, and adds the results of his own investigations. In order that a normal prothrombin content of plasma be maintained, at least two physiological functions are essential. First, an adequate amount of vitamin K must be absorbed before the liver is enabled to produce prothrombin and the presence of bile in the intestine is necessary for such absorption. Secondly, the liver may be incapable of producing prothrombin on account of extensive organic liver disease. The differential diagnosis between intrahepatic and obstructive jaundice can be made with a high degree of accuracy when one observes the plasma prothrombin response to a course of vitamin K therapy. In obstructive jaundice uncomplicated by acute cholangitis, and when the jaundice is of less than 8 weeks' duration, there is a very rapid response to the oral or intravenous administration of an adequate amount of vitamin K. Most patients with uncomplicated obstructive jaundice even of from 2 to 6 months' duration will demonstrate a prothrombin result to vitamin K therapy which will enable one to differentiate clearly between obstructive and intrahepatic jaundice. On the other hand, in patients with jaundice of intrahepatic origin, such as results from toxic hepatitis or cirrhosis, the plasma prothrombin response is either low or there is no change at all. If at the end of 24 hours of adequate vitamin K therapy little or no prothrombin response has occurred, the test indicates advanced hepatic disease and suggests that the jaundice is intrahepatic rather than obstructive. Erratic prothrombin response with the prothrombin value returning nearly to normal after 24 hours of vitamin K therapy signifies an obstructive type of jaundice. The plasma prothrombin should be below 80 per cent of normal before the diagnostic result is used as a criterion in the differentiation between these two types of jaundice.

P. F. Hansen and H. Begtrup² (Copenhagen) publish the results of their investigations on the response of blood prothrombin to vitamin K therapy in 18 cases of jaundice. Full details of their investigations are recorded. Their results, although independent, confirm the conclusions given in the previous article.

F. Steigmann and others³ (Chicago) review the value of liver function tests in clinical medicine based on long experience. They discuss first tests to differentiate between medical and surgical jaundice, which may be stated as the difference between hepatitis and obstruction. They review 7 tests, which include the cephalin cholesterol flocculation test, but do not refer to the prothrombin test. They state that the application of these liver function tests raises the percentage of correct diagnoses, as checked by follow-up study, operation, or post-mortem examinations from 80 to 95 per cent. The chief cause for failure in 5 per cent was that patients with obstructive jaundice first came under observation at a time when secondary hepatitis had already developed. Improvement in liver function tests alone will not decrease the percentage of failures. Improvement can be expected only from more accurate clinical observation and care in taking the history. The authors next consider tests which indicate the onset of acute liver necrosis or atrophy either superseding in obstructive jaundice or in the course of acute hepatitis. They place greatest reliance on a drop in prothrombin level only partly relieved by administration of vitamin K.

J. H. Mateer and others⁴ (Detroit) have introduced and studied a new technique for the *bromsulphalein* test. Instead of the usual dose of 2 mg. per kilo they use a dosage of 5 mg. per kilo. They have made careful studies of normal persons and in comparison with other tests. The new test is 62 per cent more sensitive than with 2 mg., and is of the same degree of sensitivity as the hippuric acid and the cephalin tests. It is noted that with the larger dose some patients have reactions, including transient headaches and chills. These occur about 45 to 60 minutes after the injections. It is stated that no prolonged unfavourable after-effects have been demonstrated.

C. Cohn⁵ (New York) has used *sodium d-lactate* as a test of hepatic function. A solution is injected intravenously, the technique being similar to other tests. Thirty-four of 36 patients with jaundice due to diffuse hepatitis showed an abnormal retention of injected lactate. In only 4 of 24 patients with obstructive jaundice was there an abnormal retention of lactate, and operation or autopsy showed considerable associated injury to the hepatic cells in 3 of these 4 cases. The author believes that the lactate test reveals a greater incidence of correct results than other similar tests.

REFERENCES.—¹*Internat. Abstr. Surg.* 1943, 76, 401; ²*Acta med. scand.* 1943, 113, 1; ³*J. Amer. med. Ass.* 1943, 122, 279; ⁴*Ibid.* 121, 723; ⁵*Arch. intern. Med.* 1942, 70, 829.

LOW BACK PAIN AND SCIATICA. (See also INTERVERTEBRAL DISCS, RUPTURED.)

T. P. McMurray, F.R.C.S.

The differentiation and recognition of the almost numberless conditions which may give rise to chronic aching in the lumbosacral region, associated with pain along the sciatic nerve, is one of the most difficult problems of orthopaedic surgery. Although it is recognized that this syndrome may have an anatomical, infective, or toxic origin, more and more stress is being placed in the surgical literature on the important part played by the nucleus pulposus in its causation. It is now generally recognized that a condition of continuous backache associated with persistent sciatica which does not respond to any of the usual forms of treatment, may be caused by the protrusion backwards into the spinal canal of the central gelatinous portion of an intervertebral disc. These protrusions or retropulsions of the nucleus pulposus may occur at any level of the spinal column, but are encountered most frequently in the discs between the 4th and 5th lumbar vertebrae, or between the 5th lumbar and 1st sacral segments. The obvious explanation of the frequency of their occurrence in this region is to be found in the size of the disc at this level, and in the great strain to which this area is being

constantly subjected. Although the lumbar and lumbosacral regions are the common sites of the occurrence of retropulsion, similar displacements have been observed in many other regions, where they may be entirely symptomless or may cause serious disability. Dandy¹ records 3 instances in which extremely grave complications followed on retropulsion of the disc in other areas of the spine. In one case the displacement occurred in the cervical region, and, because of the size of the protruded mass, the cord was compressed so severely as to cause a fatal result. In another patient the displacement was present in the thoracic region, and was so large that the cord became pressed against the lamina, producing a paraplegia which could be relieved only by operation. In the third instance, a large retropulsion in the lumbar portion of the spine was followed by a permanent loss of sensation and incontinence.

Although the importance of retropulsion as a factor in the production of persistent sciatica has been accepted, there is as yet no general agreement on the method of diagnosis, or on the best method to be employed in the removal of the protruded mass. In a further communication Dandy² goes further than any of his fellow experts and claims that the diagnosis of ruptured intervertebral disc can be made from the clinical evidence alone. He states that the signs and symptoms produced by the protrusion are low back pain spreading down the posterior aspects of one or both thighs. This pain is intensified by coughing or sneezing, and recurs at more or less regular intervals. In his opinion, in the examination of the patient one item only is of importance, namely, the reduction or absence of the Achilles reflex on the affected side. He deprecates the use of contrast media in the spinal canal, stating that similar radiographic appearances can be caused by the presence of a concealed disc, which cannot be found at operation until the subdural space is carefully explored.

The possibility of arriving at a correct diagnosis without the use of opaque material in the spinal theca is also supported by Hyndman, Steindler, and Wolkin,³ who agree as to the possibility of diagnosing the condition on clinical evidence alone, but state that in a small proportion of the patients, in whom the signs are indefinite, it is necessary to use an intrathecal injection.

The views expressed as to the methods which should be adopted in the removal of the protruded mass vary considerably. Ghormley, Love, and Young⁴ stress the importance of what they describe as the combined operation. In this procedure, after removing the protruded nucleus, the gap left in the laminae is covered by a bone-graft taken from the tibia. In a tabulation of the end-results obtained by this method, they state that, following the combined procedure, good results were obtained in 64 per cent, in 25 per cent of the patients the result was only fair, while in 11 per cent the final stage could only be classified as bad. One interesting statement in this report is that, so far as the authors could discover, there was no instance of recurrence of the protruded disc following the operation. That a recurrence of the protruded and excised nuclear mass may occur is suggested by Dandy, who claims that removal not only of the protruded disc, but curettage of the whole of the lining wall of the cortical cartilage right down to the bone, is essential. He states that by this means recurrence of the soft semi-solid secretion, which constitutes the nucleus pulposus, is prevented or at least is rendered less likely to occur. In regard to bony fixation of the spine following the removal of the retropulsed mass, Dandy advises against the routine fusion of the spine, as advocated by Ghormley, Love, and Young. He agrees that, while the procedure is inadvisable as a rule, bony fusion may be of benefit in those patients in whom the retropulsion is associated with some degree of spondylolisthesis.

REFERENCES.—¹*J. Amer. med. Ass.* 1942, 119, 474; ²*Ann. Surg.* 1942, 115, 514; ³*J. Amer. med. Ass.* 1943, 121, 890; ⁴*Ibid.* 1942, 120, 1171.

LUNG, ABSCESS OF. (*See also* RADIOLOGY : DIAGNOSIS.)*Maurice Davidson, M.D., F.R.C.P.*

The aetiology of lung abscess has long been a subject of some controversy, and different views have been expressed as to the relative importance of inhalation and of embolism as causative factors. R. C. Brock, F. Hodgkiss, and H. O. Jones¹ have published a series of observations in support of the view that inhalation is the chief though not the only cause of pulmonary abscess. It is pointed out that the two chief sites of election of these abscesses are the sub-apical and axillary portions of the upper lobes, and the apical part of the lower lobes; the explanation of this is found in posture, the reason for the frequent involvement of the upper lobes being inhalation during the favourable conditions of deep sleep or anaesthesia. After recapitulating the various arguments for the hypothesis of bronchial embolism depending on posture, the authors describe a series of simple bronchographic experiments to demonstrate the passage and distribution of small amounts of opaque oil injected through the anterior wall of the trachea with the patient lying either on his right side or on his back. Study of the subsequent radiographs showed that the greatest filling was in the axillary branches, and especially in the sub-apical and axillary pectoral divisions. Their experiments provide considerable addition to the *a priori* evidence afforded both by clinical observation regarding the position of lung abscesses and by considerations of the anatomy of the bronchial tree. (*See* BRONCHIAL TREE, ANATOMY OF.)

REFERENCE.—¹*Guy's Hosp. Rep.* 1942, 91, 13.**LUNG, COLLAPSE OF.***Maurice Davidson, M.D., F.R.C.P.*

G. de Takats, G. K. Fenn, and E. L. Jenkinson,¹ reviewing the evidence for reflex broncho-constriction and secretion following pulmonary embolism, discuss the significance of this mechanism in relation to post-operative pulmonary collapse. They emphasize that obstruction of bronchi and increased secretion, both of which have been shown experimentally to result from vagal stimulation, are essential factors in the production of collapse of the lung. Having noted that a stimulus for broncho-constriction and increased secretion is provided by pulmonary embolism, they demonstrated the similar effect upon the bronchial tree of stimuli due to various intra-abdominal manipulations, e.g., traction on the cystic duct, and pulling on the mesentery. The changes in the pattern of the bronchial tree are illustrated by one set of bronchograms; an accompanying illustration shows the effect of atropine in inhibiting these changes. Trauma of the chest wall is also shown to produce a like reflex effect. The comparatively infrequent appearance of the classical triangular shadow of lung infarction in a radiograph is, in the view of the authors, a reason for supposing that without definite clinical data the radiologist is not in a position to make a diagnosis of pulmonary embolism.

Believing as they do that the radiographic shadows commonly seen in many cases of pulmonary embolism are really due to areas of pulmonary collapse produced by reflex broncho-constriction, they urge the use of atropine in the treatment of this condition.

H. W. Schmidt, L. H. Mousel, and S. W. Harrington² give a summary of 84 selected cases of post-operative pulmonary collapse. They consider that this complication almost always results from decreased pulmonary ventilation and inadequate endo-bronchial drainage, and they emphasize the usefulness of bronchoscopic aspiration both in the prevention and in the treatment of collapse of the lung following abdominal operations.

REFERENCES.—¹*J. Amer. med. Ass.* 1942, 120, 686; ²*Ibid.* 895.

LUNG, CONGENITAL ABSENCE OF. *Maurice Davidson, M.D., F.R.C.P.*

Congenital hypoplasia and mal-development of pulmonary lobes or of a whole lung is a rare condition. V. O. B. Gartside¹ reports an interesting example in a boy aged 7, diagnosed as a case of pleural effusion, and sent to a department of thoracic surgery for investigation. Bilateral cervical ribs were discovered on examination; the left side of the chest was flattened and dull to percussion, and movement was impaired. X-ray examination showed diffuse opacity of the left field, the heart and trachea being displaced to the left, the position of the diaphragm being normal. A bronchogram (*Plate XX*) showed that the left main bronchus was about half the normal length, but tapering to end in a small bronchus which subdivided into numerous slender branches supplying a wedge of normal lung tissue lying in the costo-vertebral gutter above the dome of the diaphragm. The author points out that agenesis of the lung is not recognizable by ordinary clinical examination, the diagnosis depending upon bronchography.

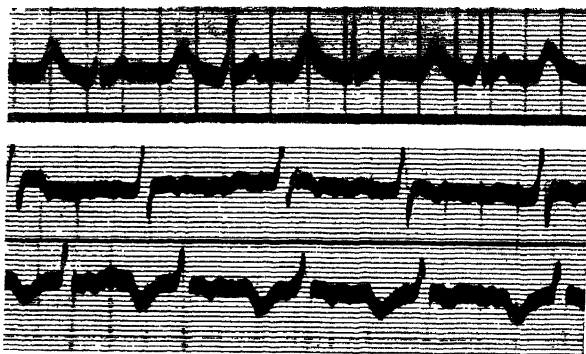


Fig. 22.—Electrocardiogram from Dr. Gartside's case of congenital absence of the lung.
(By kind permission of the 'British Journal of Radiology'.)

In this case the right middle lobe bronchus is seen to take off medially and to pass to the left hemi-thorax. When the iodized oil was introduced it flowed over the bifurcation into the right bronchial tree in spite of the fact that the patient was kept on his left side during the injection. The child was apparently healthy. Numerous abnormalities were found in the cervical spine, e.g., wedge-shaped 4th cervical and 1st dorsal vertebræ, and bifid spines of the 6th and 7th cervical vertebræ, as well as the two cervical ribs already mentioned. Of particular interest is the electrocardiogram (*Fig. 22*) which is reproduced without comment. The appearances in Lead 3 are similar to those in Lead 1 viewed upside down. Records were repeated to exclude any fallacy from crossing of the leads. A summary of the literature is given, with a useful bibliography.

REFERENCE.—¹*Brit. J. Radiol.* 1943, 16, 69.

LUNG, CYSTIC DISEASE OF. *Maurice Davidson, M.D., F.R.C.P.*

F. E. Saxby Willis and J. Almeyda¹ in a long and extremely well illustrated article have suggested a new classification of broncho-alveolar cysts based on clinical, radiological, and histological grounds, and designed to bring into line the various views expressed by numerous well-known authors as to their origin and pathogenesis. A good account is given of the general clinical features, age and sex incidence, distribution, and association with other disease of the lung and pleura. The second part of the article is devoted to a description of

PLATE XX

CONGENITAL ABSENCE OF THE LUNG

(V. O. B. GARTSIDE)



Bronchogram showing the condition.

*By kind permission of the
'British Journal of Radiology'*

the different varieties of cyst with accounts of the clinical pictures. The series of radiographs and bronchograms which accompany the text is excellent, the pictures being clear and instructive. The article is well documented.

C. E. Field² reports 4 cases of cystic conditions of the lung in children, with two good radiographs. Brief but instructive clinical notes are given in each case, and a short comment is added on the principles which should underlie the treatment of such cases. This is a useful contribution to the literature of the subject.

REFERENCES.—¹*Tubercle, Lond.* 1943, **24**, 22, 43; ²*Proc. R. Soc. med.* 1943, **36**, 584.

LUNG, INJURIES OF: LUNG-BLAST. *Maurice Davidson, M.D., F.R.C.P.*

Research on the manifestations of blast injury to the lungs and the anatomical and histological features of this condition were reviewed in the MEDICAL ANNUAL of 1942. A recent communication by R. E. Tunbridge and J. V. Wilson¹ has been published in abridged form, giving the substance of a long report which cannot in the present circumstances be printed in full. In addition to a comprehensive review of the literature up to date the authors have given very full and complete details of cases which came under their observation in Malta, with notes on the post-mortem findings in those on which autopsy was permitted. Among their observations in regard to treatment is the view that when in addition to lung-blast there is surgical shock, due to the presence of other injuries, the usual methods of dealing with shock, including intravenous injection of whole blood or blood products, should not be withheld, even though theoretically and practically there is a risk of increasing the pulmonary congestion. They classify patients with moderately severe blast injury into three main groups for clinical purposes.

1. Those with injuries referable to blast alone.
2. Those with blast injuries and an associated injury.
3. Cases from either of the above groups in which the onset of serious symptoms is delayed for 48 hours or more. It is these cases which give rise often to difficulty, since, if an anæsthetic has been administered, the delayed symptoms may be attributed to some post-operative pulmonary complication.

On the whole they are of opinion that the clinical importance of blast injuries has been over-emphasized; apart from rapidly fatal cases, the only significant feature in their view is the possible harmful effects that exposure to blast may exercise upon the body's normal mechanisms.

REFERENCE.—¹*Quart. J. Med.* 1943, **12**, N.S., 169.

LUNG, TUMOURS OF. *Maurice Davidson, M.D., F.R.C.P.*

The mass of experimental work on carcinogenetic substances has so far borne little relation to practical problems of lung cancer from the standpoint of practical surgery, though much has been elucidated as to the genesis and behaviour of these tumours in the experimental animal. J. Argyll Campbell¹ contributes a further paper on lung tumours in mice and men showing the percentage incidence of neoplasms of the lung in relation to various forms of dust and the significance of the increase in such incidence. Details such as the degree of dusting of the animals, the average dust deposit and increase of lymph-tissue in the lungs and tracheo-bronchial lymph-nodes, the influence of heredity and susceptibility, and the morphology of lung tumours, are discussed.

The author maintains that a similarity exists between human lung cancer and mouse cancer as regards the agents which increase the incidence of such tumours, the time or age factor, some aspects of susceptibility, and the morphology of the tumours. He thinks there is no fundamental reason why the results obtained in mouse experiments with dusts should not apply to human beings.

REFERENCE.—¹*Brit. med. J.* 1943, **1**, 179.

LYMPHOPATHIA VENEREA (Lymphogranuloma).*T. Anwyll-Davies, M.D., F.R.C.P.*

W. E. Courtts¹ states that cunnilingus or anal coitus may cause infection. In men, a simple œdema of the meatus, with slight serous discharge, engorged lymphatics extending upwards along the penis, and purple coloration with œdema of the foreskin are the principal signs. In women, chronic œdema associated with esthiomène is more often observed. Urethritis may appear in the male as a primary manifestation. The virus may cause urethral strictures, prostatitis, vesiculitis, and epididymitis.

The tabulated data of A. W. Grace² (Brooklyn) show that symptomatic lymphogranuloma venereum is found in 1 per 1000 persons admitted to the New York Hospital. Asymptomatic lymphogranuloma occurs more frequently than the symptomatic form and is commonly observed among those who have other venereal diseases. Nearly half the syphilitic patients at the New York Hospital were found to have asymptomatic lymphogranuloma; during 1936-41 there were 9 cases of asymptomatic to 1 symptomatic lymphogranuloma venereum. The sulphonamide drugs will cause regression of lymphogranulomatous inguinal adenitis, suppurative and non-suppurative, within a period of about 5 weeks. Sulphathiazole is preferable to sulphanilamide and should be given in a course of 1.5 g. 3 times daily for 2 weeks, followed immediately by 1 g. 3 times daily for 3 weeks. Long-standing cases, and all cases with strictures, require at least one year's therapy, with rest periods of from 2 to 3 weeks after each course of treatment. Anal discharge recurring after apparent cure can be controlled by sulphathiazole. Grace believes that lymphogranulomatous proctitis should be treated by alternation of a sulphonamide compound and inactivated virus, the latter to be administered intravenously and derived from the chick embryo.

REFERENCES.—¹J. Urol. 1943, 49, 595; ²J. Amer. med. Ass. 1943, 122, 74.

MALARIA. (See also QUININE AND ITS SUBSTITUTES IN THE TREATMENT OF MALARIA.) *Sir Philip Manson-Bahr, C.M.G., D.S.O., M.D., F.R.C.P.*

Aetiology.—Some interesting experiments in the transmissibility of inoculation strains of *Plasmodium vivax* have been carried out in the Saint Anne Asylum in Paris where *P. vivax* used for malaria therapy has been kept going by mechanical transmission from man to man since 1923, but during this long period it has never been transmitted through anopheles. It is still capable of producing gametocytes sufficient in quantity to infect these insects. Two batches of female *Anopheles maculipennis (atroparvus)* were fed on patients in whose blood gametocytes were present. No mosquitoes became infected; no sporozoites were ever found and all attempts to infect susceptible patients with these mosquitoes failed. It was found that the gametocytes had also lost their powers of exflagellation. (E. Roubaud, V. Chorine, and P. Guiraud.¹)

Diagnosis.—In malaria blood-pigments are set free and appear in the urine. Thus pyrrol bodies, after oxidation, show a definite absorption band in the spectrum and this can be displayed by the following test: Concentrated HNO₃ is added to the urine and a brick colour develops at the line of contact and the mixture becomes red on shaking. An amyl alcohol extract of this pigment shows, on the spectroscope, a sharply defined band from *b* to a little over the mid-point between *b* and *F* (λ 517-500 m μ). This may be apparent by examination of the urine alone, but in doubtful or negative cases the amyl alcohol extract usually gives the typical spectrum. Urorosein and urobilin can easily be eliminated by extraction with ether or chloroform. (M. Tomita.²)

Complement Fixation.—As the establishment of a reliable complement-fixation reaction is so eminently desirable any improvement in technique in this direction is welcome. J. C. Ray and his colleagues³ have prepared a

Plasmodium knowlesi antigen by alternately freezing and thawing a suspension of heavily infected red blood-corpuscles from a monkey or by exposing infected red blood-corpuscles to monkey red-cell haemolysins prepared by injecting normal monkey erythrocytes into rabbits on a number of occasions. Whilst freezing and thawing left a certain amount of corpuscular material adherent to the parasites the haemolysin method removed all traces of red cells from the parasites. By washing and centrifuging an extract of a high degree of purity could be obtained. Antigens for the complement-fixation test were prepared from saline extracts of spleen and blood of monkeys during the terminal stages of acute infection. With the serum of immunized rabbits and the antigen it was possible to carry out complement-fixation reactions.

A. D. Dulaney and his colleagues⁴ have published a critical survey of the diagnostic value of the complement-fixation test in malaria. It has been shown that complement fixation is closely correlated with the actual or recent presence of malaria parasites in the peripheral blood; in most cases the antibody titre falls off rapidly after the administration of quinine. Sera of 675 people have been tested—317 patients suggesting malaria, 170 others suffering from bacterial or protozoal diseases other than malaria, and 188 normal. Antigen made from *P. knowlesi* was prepared in the manner described by Coggleshall and Eaton. For routine tests 0.1 c.c. of serum, 0.1 c.c. antigen, and 2 units of complement were used. Incubation in a water-bath at 37° C. for one hour was followed by the addition of sheep blood-cells and 2 units of amboceptor. Readings were made after a second incubation of 20 to 30 minutes.

Of the 125 patients, whose blood harboured malaria parasites, 81.6 per cent gave a positive (3-4 plus) reaction, 23 gave a negative, but about one-third of the subjects in both groups had received some anti-malarial treatment. Fifteen patients gave a positive complement-fixation test at a time when the blood-film was negative. Malaria was ruled out as a diagnosis in 177 patients with negative blood-films and negative complement-fixation tests. There was agreement between blood-film and complement-fixation tests in 88 per cent.

Sera from patients suffering from leprosy, amoebiasis, and Chagas's trypanosomiasis gave a high proportion of positive reactions; 2 out of 45 sera from patients with acute febrile diseases gave positive reactions, and there were 7 positives amongst the 188 sera from normal persons. It was thus shown that complement-fixation tests with *P. knowlesi* antigen give specific results and may prove supplementary to blood-film examination.

Non-specific Serum Reactions.—The occurrence of non-specific serum reactions is now generally recognized, but their extent and importance is still somewhat obscure. Thus in malaria a positive Wassermann reaction is connected with appearance of parasites in the blood, can occur when they are absent, but it is generally believed that a positive Wassermann reaction in the cerebrospinal fluid is never caused by malaria. Some believe that a positive reaction is the result of cell destruction with the production of lipid substances in the circulation. During a year (1941-2) H. Harmsen and A. Hauer⁵ examined the serum of patients suffering from benign tertian malaria, but without any clinical signs of syphilis. By employing the Wassermann, Kahn, and Meinicke tests they obtained positive reactions in 572 out of 1000 tests. The proportion of positive tests depends on how long after the onset of fever the test is made. Many negative results were recorded in relapsed cases. Fresh infections with high fever gave a high percentage of positives up to 90 per cent of those tested after the fourth or fifth febrile attack. The Kahn test gave the most positive reactions, next came the Wassermann reaction, whilst the Meinicke often gave a doubtful or weak positive. It appears to be characteristic of this non-specific reaction that the Wassermann reaction and Kahn appear when the Meinicke is negative

or weak. Patients with strong positive reactions usually respond well to treatment and a lasting cure follows. On the other hand in those with a tendency to relapse the serum is usually negative.

Treatment.—

The Critical Antimalarial Problem and its Solution.—The loss of Java has deprived the Allies of the source of 90 per cent of the world's pre-war quinine supply; moreover military operations are taking place to a large and ever increasing extent in countries in which malaria is endemic or hyperendemic. To make the most of the limited stocks of available quinine, the National Research Council and the War Production Board of the United States have framed the measures which are set out in a paper by L. H. Meed.⁶

The use of quinine and other cinchona alkaloids is restricted to the treatment of malaria, except that quinidine may be used in the treatment of cardiac disorders and quinine may be used in the treatment of myotonia congenita.

More use is to be made of *totaquine*. On the advice of the National Research Council the *U.S. Pharmacopœia* has now adopted the following definition: Totaquine is now described as a mixture of alkaloids from the bark of *Cinchona succirubra* or other suitable species of *Cinchona*. It contains not less than 7 per cent and not more than 12 per cent of anhydrous quinine, and a total of not less than 70 per cent but not more than 80 per cent of the anhydrous crystallizable cinchona alkaloids; this designation refers to cinchonidine, cinchonine, quinidine, and quinine. The dose recommended is 10 gr. three times daily for seven days.

The production of *atebrin* suffices for all anticipated needs. It is interesting to note that pharmacological and clinical investigations have shown that some persons receiving *atebrin* as a clinical prophylactic have temporary gastrointestinal disturbances. The yellow pigmentation of the skin during administration is harmless and not associated with disturbance of liver function.

The American Subcommittee on Tropical Diseases of the National Research Council recommend as an efficient therapy routine:—

1. *Combined Q.A.P. Treatment* (method of choice).—

a. Totaquine or quinine sulphate 10 gr., thrice daily after food, for 2–3 days or till fever is controlled.

b. *Atebrin* 0.1 g. thrice daily after meals for the next five days.

c. Two days without antimalaria medication.

d. Plasmoquine 0.01 g. thrice daily after meals for five days (twice daily for debilitated patients).

2. *Atebrin-Plasmoquine Treatment.*—In simple *P. vivax* infections, or when no quinine or totaquine is available, *atebrin* in the above doses may be given for seven days, then two days free from antimalaria medication, followed by five days plasmoquine medication as above.

3. *Totaquine or Quinine-Plasmoquine Treatment.*—If no *atebrin* is available quinine or totaquine is given as above for seven days, during the last five days of which each dose of totaquine or quinine is associated with plasmoquine 0.01 g. (thrice daily).

4. *Suppressive Treatment.*—*Atebrin* 0.1 g. twice daily after food twice weekly. Two or three days' interval should be allowed between days of medication. Cinchona barks from South America with low quinine content, but sufficiently rich in total crystallizable alkaloids to make totaquine, may be available in sufficient quantity to enable totaquine to replace civilian requirements in the U.S.A.

Blood Changes produced by Atebrin.—W. Hühne⁷ has had the opportunity of studying the changes produced by *atebrin* in a number of pernicious cases of malignant tertian malaria in Greece. The changes were observed in Giemsa-stained preparations of the blood. The following changes were observed which

the author believes were due to the action of this drug: (1) Swelling of the cytoplasm of the young ring-forms. (2) Separation of the nuclei of the young ring-forms from the wall of the ring. The nucleus appears as a separate body within the ring. (3) Complete destruction of the cytoplasm of the young ring-forms, the nuclei only being visible in the erythrocytes. (4) Swelling of the cytoplasm of the half-grown forms and the appearance of pigment in the cytoplasm: swelling of the chromatin. (5) Fragmentation and destruction of the chromatin: massing of pigment on the periphery of the cytoplasm. (6) The cytoplasm of the half-grown forms becomes completely altered; vacuolation sets in and at times is seen to be pronounced.

REFERENCES.—¹*Ann. Inst. Pasteur*, 1941, 67, 462; ²*Hoppe-Seyl. Z.* 1941, 270, 14; ³*Ann. Biochem. exp. Med.* 1941, 1, 101; ⁴*J. infect. Dis.* 1942, 70, 221; ⁵*Dtsch. med. Wschr.* 1943, 69, 147; ⁶*J. Amer. med. Ass.* 1942, 120, 1043; ⁷*Dtsch. trop. Z.* 1942, 46, 385.

MASS RADIOGRAPHY OF THE CHEST IN RELATION TO PULMONARY TUBERCULOSIS. (See also RADIOLOGY: DIAGNOSIS.)

W. Ernest Lloyd, M.D., F.R.C.P.

During the past year a number of important contributions to the subject of mass radiography of the chest have been published and facts are gradually accumulating on a number of important aspects of the problem. These are of special significance as the method is now being applied to the civilian population, for all are agreed that this method of investigation, carried out up to the present time chiefly on members of His Majesty's Forces, becomes a much more difficult problem when civilians are concerned. In the latter, the examination will be voluntary and tactful propaganda will be necessary if large numbers are to respond to it, and in this matter the National Association for the Prevention of Tuberculosis will play an important part by means of its propaganda films and leaflets. Emphasis must be laid on the confidential nature of the investigation and on the good results of efficient treatment when pulmonary tuberculosis is diagnosed in its early stage. The economic problem of treating these cases has also been anticipated, and in April the Minister of Health announced that allowances would be paid to such persons during the period of treatment. These announcements will undoubtedly play a big part in launching successfully this new approach to the treatment of tuberculosis. The allowances described below were published by the Ministry of Health in their Memorandum 266/T.¹ This is entitled *Pulmonary Tuberculosis*, and should be studied in conjunction with another publication of the Ministry, namely, *Advisory Report on the Working of a Mass Radiographic Unit*.² This is the report of a sub-committee of the Minister of Health's standing advisory committee on tuberculosis. The recommendations in this report have been adopted by the Minister, and the report will be a guide to those who will be called upon to conduct the mass radiography surveys amongst the civilian population.

Part I of the report is introductory, and in it the function of mass radiography is described as a means of sifting out from a number of apparently normal persons those whose condition requires further individual diagnosis by established methods. Emphasis is laid on the need for carefully designed apparatus and for skilled radiographers, and examinations with improvised apparatus are strongly discouraged.

Part II describes briefly the apparatus to be used and its operation (a full description is given in the *Report of the Committee of the Medical Research Council on Tuberculosis in Wartime—Special Report Series No. 246*). The apparatus has not been designed for a high degree of portability.

In planning a mass radiography survey, provision must be made for (a) X-ray room, (b) dressing-rooms, (c) dark room, (d) projection room for viewing the

films, (e) rooms for the medical director, radiographers, and clerks, and (f) a store room. The following procedure for taking miniature films has been found satisfactory : (1) Persons attending at one time should be of the same sex, and for intensive work groups of sixty should attend at intervals of half an hour. (2) A record card is filled in by the booking-in clerk, taking all cards in strict serial order. (3) The person then passes into the X-ray room and each hands the serial card to the radiographer who places it in the proper position on the apparatus, so that the number of the card is incorporated on the film. Having taken the exposure, the radiographer hands the person the serial card, who in turn hands it to the booking-out clerk. As he or she returns to the dressing-room, this clerk enters the particulars on the card in a separate day-book. The maximum time occupied in the department should be approximately half an hour. The record card is used to record the Medical Officer's opinion of the 35-mm. film, and also where necessary, reports of large-film examination, clinical examination, or any other investigation. It also records the final diagnosis and disposal of the case. The person is notified as soon as possible of the result of the examination.

The team for the operation of the unit will be under the administrative control of the Officer of Health of the Local Authority, who may delegate this duty to the Tuberculosis Officer. In charge of the team will be a Medical Director, who should preferably be a member of the tuberculosis staff of the Authority. His duties will be to have the general control and supervision of the scheme in his area and to interpret the miniature and full-size films in conjunction with the visiting radiologist. Emphasis is laid on the need for a good projector to examine the miniature films, as, without this, accurate diagnosis is impossible. The type of projector recommended is described in the appendix of the report. Recent experience suggests that there is no advantage in the films being viewed by two people simultaneously. It is also important that the responsibility for deciding if a film is normal or abnormal should rest not with a team but with one individual, who should normally be a Medical Director. Few, in this country, clinicians or radiologists, have had much experience in interpreting miniature chest-films, and opportunity should be given to both classes to obtain experience in this, perhaps the most important, step of the scheme.

Part III deals with the place of the unit in diagnosis. The miniature film should be projected to a size not exceeding 7×7 in. on a matt, white screen. Sessions for miniature-film examination should not exceed $1\frac{1}{2}$ hours. If the miniature film shows an abnormality, a full-size radiograph should be taken on the same apparatus. This procedure has the advantage that it avoids premature association with the Tuberculosis Dispensary. Any further clinical examination should be carried out by the Medical Director, and the final diagnosis will be sent to the person's private doctor with a recommendation to consult the Tuberculosis Officer if tuberculosis is suspected.

Part IV of the report deals with the place of the unit in health organization. Although the committee agreed that the immediate purpose of mass radiography is a renewed attack on tuberculosis, they recommend that the use of the units should not be too narrowly limited to the functions of tuberculosis authorities. As the operation of the scheme develops, mass radiography will probably be applied in the interests of Medicine generally and not only of tuberculosis. At present, the Tuberculosis Officer will be responsible for the disposal of cases needing treatment, and he will also advise on the appropriate treatment for other chest diseases which will be revealed by mass radiography. In all cases the co-operation of the subject's private doctor should be obtained.

Part V deals with the selection of subjects for examination. Wise propaganda will be necessary if large numbers are to be examined, and it is not expected

that the numbers who voluntarily agree to have their chests radiographed will reach the capacity of a single unit which could deal with 1000-1200 examinations per week. In obtaining subjects for examination, the point to be impressed is that the examination provides information—reassurance, if no abnormality is found, and the opportunity, if abnormality is found, to apply the remedy at a stage which is favourable to early recovery. Mass radiography cannot be forced on the public. The selection of cases in any area will depend on local circumstances. The desirability of arranging as soon as possible for the periodic examination of persons in the younger age-groups should be borne in mind. Experience has shown that there is much unsuspected tuberculosis in the middle age-groups, and as these are important sources of infections, as many as possible in these age-groups should also be included in the survey. Approach to those in employment must be made through employers only, and any attempt to make examination a condition of employment must be discouraged. The representatives of the Trade Unions should be informed when factory employees are approached, and the employees must be assured that the information obtained by the examination is confidential. (The Trade Union Congress supports the arrangements now being made and support has also been given by the British Employers' Confederation.) If there is a Works Medical Officer, his co-operation should be secured, but if his presence may embarrass the subject, it will be necessary to confine his part in the work to general matters. It will greatly help the scheme if employers will agree to pay wages for the time spent during the examination. (So far as the Government are concerned, they accept the principle that compensation will be paid for time off for the examination.)

Part VI deals with the important subject of Records, and the form of the record card, which is 6×4 in., is reproduced in an appendix to the report. The county or county borough in which the subject lives is indicated on the record card by the cipher appropriate to the Insurance Committee for that area. A table is given in an appendix. The occupation and occupation code number to be entered on the card should conform to the occupational classification used by the Registrar General. The card also records family history, past illnesses, and history of any contact with a known case of tuberculosis. To meet the need for a uniform classification of results, the Committee has drawn up a standard classification of diseases and abnormalities of the chest, and also a suggested terminology for use in cardiovascular abnormalities detected by mass radiography. These classifications are included in further appendices to the report.

Allowances and Grants during Treatment for Pulmonary Tuberculosis.—Memorandum 266/T of the Ministry of Health describes fully these allowances which the Government will pay to help men and women who need treatment for pulmonary tuberculosis but for whom treatment will mean an interruption of earnings or other income. These allowances will be paid by the Local Authority that is responsible for the treatment. They will be paid while the patient is undergoing treatment, provided that the patient follows a course of treatment advised by the Tuberculous Officer of the Local Authority. There are three kinds of payment: (1) Maintenance allowances based on a standard scale and without any test of means. (2) Discretionary allowances, on proof of need, towards meeting standing charges—such as high rent or rates, insurance premiums, and school fees. (3) Special payments to meet certain special circumstances. For male applicant and wife or female applicant with dependent husband the allowance is 38s. per week. The allowance for dependants varies from 12s. per week for a child aged 16 or over to 5s. per week for a child under 10. The above scale rates will be increased by a rent allowance not exceeding

15s. a week, and they will be decreased by any benefit payable under the National Health Insurance Act, or pension received from the Ministry of Pensions or other public funds wholly in respect of tuberculosis, and by 10s. a week where the applicant is being treated in an institution. For details of the above allowances, the discretionary allowances, and the special payments reference should be made to M266/T. It is to be noted that the purpose of the allowances is to help patients suffering from tuberculosis during their treatment with the expectation that by undertaking early treatment instead of continuing to work at the risk of breakdown, there will be an increased prospect of restoring them to health and normal working capacity. The purpose of the allowances cannot be met where treatment cannot do more than alleviate a chronic condition. [This latter stipulation has already raised much adverse criticism, and the Tuberculosis Officer will have the invidious task of differentiating between hopeful and chronic cases. Furthermore it is to be noted that only patients with pulmonary tuberculosis are to be benefited, and joint tuberculosis, for example, is not included. It is hoped that the allowances will be readjusted in the near future to meet these criticisms.]

Radiological Technique and the Radiological Appearances of Early Pulmonary Tuberculosis.—It cannot be emphasized too often that the interpretation of chest films, both miniature and full-sized, calls for the greatest care and experience. The Ministry of Health have published a Memorandum entitled *The Radiological Appearances of Early Pulmonary Tuberculosis*, and this will be a guide to those who will interpret the films, but nothing can take the place of the experience which is gained by a careful study of a very large number of films. In this Memorandum,³ written by R. R. Trail and P. Kerley, the normal postero-anterior radiograph of the chest is described. The essential points of a first-class radiograph are: (a) The complete thoracic cage must be on the film. If the costophrenic angles are not included, early pleural effusion or a localized pleural thickening may be overlooked. (b) The right and left pulmonary arteries and their main lobar divisions should be clearly visible and sharply defined. The ideal penetration is one which just shows the big lower-lobe arteries faintly through the heart shadow. This is not to say that the spine should be clearly visible. (c) The outline of the cardiovascular shadow must be absolutely sharp. For this, the best exposure is 0.08 sec., but in the majority of cases it can be achieved by 0.1 sec. and the authors suggest that the latter figure might well be taken as the standard exposure. (d) The translucent shadow of the trachea should be visible for about 3 inches below the sternal notch. (e) Other useful points which may be noted are the interlobar fissure between the right upper and middle lobes, the inferior vena cava in the right cardiophrenic angle, and the subclavian vein crossing the left apex, but none of these is constant.

Irrespective of the distance at which the radiograph is made, the kilovoltage used will range between 55 and 70 according to the thickness of the individual. It cannot be too strongly emphasized that it is possible to eliminate the shadow of any early tuberculous lesion by over-penetration. Too much emphasis has been laid on the target-film distance as a factor in the production of detail. With a four-valve apparatus there is no material difference in the detail between 5 and 6 feet. Speed of exposure is far more important than distance, and an excellent-quality radiograph can be made with a small unit in 0.1 sec. at 36 inches distance. It is always wiser with a small unit to work at a short distance with a fast exposure time. It is not advisable, nor is it ever necessary, to work at a distance less than 36 inches. A fine-focus rotating anode tube is the ideal. Good results can be obtained with a 6-kw. 3.2-mm.-line focus tube. The use of a broad focus tube with a line focus of more than 3.2 mm. is to be deprecated

as it gives very poor detail. Much better results are obtained at a short distance with 100 ma. from a 3.2-mm. tube than at a long distance with 200 ma. from a 4.8-mm. tube. A standard time, milliamperage, and distance should be established for each unit. It is then only necessary to alter the kilovoltage. It is absolutely necessary to maintain a standard technique in following up cases of tuberculosis, and technical factors employed should be written on the film or case sheet at the time of the first examination.

The second part of the Memorandum describes the radiological appearances of early tuberculosis. The two common manifestations are (a) a round, fairly sharply defined shadow, and (b) an ill-defined shadow. In many instances the two types overlap, and a round shadow may become ill-defined or an ill-defined shadow may become round and sharp. A single round opacity commonly known as an Assmann focus usually develops in one of the upper lobes. It varies in size from 1 to 2.5 cm. The focus may be better outlined in an A.P. view rather than in the usual P.A. view. Single or multiple round foci are often concealed by overlapping bony shadows. A more unusual form of early tuberculosis is first seen as a collection of small spots in one apex. The activity of this type of lesion can only be assessed by serial observations. The ill-defined opacity of early tuberculosis is also usually situated in one of the upper lobes. Closer examination of such a focus, which is seldom less than 1 cm. or more than 2.5 cm. in size, shows that the opacity is not homogeneous but is made up of opacities of varying density. What happens to these foci? (a) They may disappear after 12–18 months and leave no trace of their presence; (b) They may become smaller and denser; and (c) They may calcify, these being of the granular type. If a focus is calcified or very sharply defined, it is probably inactive.

Activity of a focus is proved by frank cavitation, but certain other radiological changes indicate that the lesion is not progressing favourably. These are: (a) The appearance of a local pleural reaction, often seen in the costophrenic angle. (b) The appearance of local oedema; this causes the outline of a well-defined round focus to become hazy and ill-defined. (c) Increased striation on the hilar side of the shadow. (d) The appearance of a central area of translucency in the shadow, which means that cavity formation is commencing. The rate at which a lesion heals is always slow, but the rate at which a lesion progresses is very variable. A lesion may cavitate in 2 to 3 weeks, but, on the other hand, a cavity may not develop until 12 months or longer, even 2 or 3 years, after the lesion was first observed.

The differential diagnosis of these shadows is discussed, and finally some unusual radiological manifestations of early tuberculosis are described. The paper is illustrated by many diagrams. (As the authors emphasize the small size of the usual radiological manifestation of early tuberculosis, it is obvious that the miniature film when projected must be of excellent quality if such foci are to be easily recognizable.)

Results of Investigations with special reference to Active Cases.—The largest series of cases so far recorded is that by W. D. W. Brooks in a discussion at the Royal Society of Medicine (November, 1942)⁴ and briefly quoted in the 1943 MEDICAL ANNUAL. The discussion has since been published and it calls for further consideration. Brooks reviews mass miniature radiography in the Royal Navy, which was commenced early in 1940, and the technical details worked out by the naval authorities have been of great value in extending the method to the other Services and also to the civilian population. Up to July, 1942, 166,598 navy personnel were examined and 1370 cases of the adult type of pulmonary tuberculosis were found—i.e., 8.2 cases per 1000 examined. These cases were classified according to the radiological extent of the disease, and

36.4 per cent had minimal, 42.6 per cent moderately advanced, and 21 per cent far advanced disease. Analysis of the figures shows that the relative incidence of far advanced disease increases and that of minimal disease decreases with age. Of the 8.2 per 1000 found to have radiological evidence of tuberculosis, 3.3 per 1000 after complete investigations in hospital were found to have active disease, and of these 2.2 per cent were producing tubercle bacilli, i.e., more than 25 per cent of the total with radiological evidence of tuberculosis. Apart from the 1370 cases of adult type of tuberculosis, there were 69 cases of other tuberculous lesions, which included 27 cases of active primary tuberculosis, 35 cases of pleural effusion, 3 cases of tuberculous empyema, and 3 cases of chronic miliary tuberculosis. At the same discussion, R. R. Trail gave some results of miniature radiography in the Royal Air Force. He was of the opinion that constant overhaul of apparatus working within 60 per cent of its full capacity must be maintained. A static unit could do 75,000 to 100,000 examinations in a year: 35-40 per 1000 would require full-sized radiographs, about 20 per 1000 would need complete investigation, 8 per 1000 would show evidence of parenchymatous tuberculosis, and about 3 per 1000 require sanatorium treatment. Trail was of the opinion that a long-term policy for the annual review of adolescents up to early adult life would seem the soundest policy to adopt.

A. G. Evans⁵ reports the results of 75,000 examinations in the Royal Air Force, 65,000 airmen and 10,000 airwomen. Active tuberculosis was discovered in 196 men and in 38 women—i.e., a total of 234 cases, or 3.1 per 1000 (a figure which corresponds closely to that in the Royal Navy figures quoted above). The criteria of activity was strict, and the suspected active case has a full-sized radiograph, a full clinical examination, blood sedimentation and sputum tests, and observation in station sick quarters before a diagnosis of active disease is made. The active cases are further classified into sputum-positive cases with or without symptoms, and sputum-negative cases with or without symptoms. Of the 196 active cases in men, 62 had a positive sputum and 4 out of the 38 cases in women. Evans also classified the number of cases with radiological evidence of cavitation, and remarks that it is rather alarming to note that 66, or approximately 28 per cent of the active cases, had already reached the stage of cavity formation, and of these 32, i.e., 50 per cent, had a positive sputum.

F. T. Clive⁶ reports a larger series of airwomen and analyses the results of 30,000 W.A.A.F. recruits. All cases were virtually symptomless, and those cases noted as having symptoms admitted to such only after detailed history taking. All the women were on full duty, which included marching and physical training, prior to their radiological examination, but this strenuous exercise had in no case given the patient cause for the slightest suspicion that she was not perfectly well. Active tuberculosis was found in 102 cases, i.e., roughly 3 per 1000, and 136 inactive cases, exclusive of cases of Ghon's foci with or without calcified hilar glands. The incidence of active cases in women under the age of 20 was found to be twice as high as the incidence in men as quoted by Trail. Analysing the active cases, Clive found after close questioning that 29 cases had symptoms, chiefly of lassitude, loss of weight, and cough, in that order. Sputum was found positive in 18 cases, negative in 33 cases, and entirely absent in 51 cases. Concentration, culture, and stomach content examinations were not carried out. Women tend to conceal that they have any sputum, and, in spite of advice to the contrary, are adverse to expectoration, so that the figures may be to some extent fallacious. Fever was present in 17 cases only. Discussing his findings in regard to the wider use of mass radiography in civilians, Clive emphasizes that his cases had been submitted to a thorough clinical examination, and he is of the opinion that the incidence will be higher in the civilian population.

The Treatment of Cases of Tuberculosis Discovered by Mass Radiography.—The treatment of the active case calls for little comment, as these must be treated as soon as possible by the recognized methods. The recognition of the sputum-positive case is of the greatest importance, as a source of infection has thus been discovered and treatment in such a case is a matter of urgency. It is to be regretted that, owing to the shortage of sanatorium and hospital beds, the treatment of some of these cases has been unavoidably delayed. Evans discusses the treatment requirements of the R.A.F. cases mentioned above, and assuming that the sputum-negative case with symptoms (90 cases) is treated on the same lines as the sputum-positive case (62), 152 beds will be needed, i.e., 2 beds per 1000 of those examined. In a mixed civilian population the incidence will probably be higher, needing probably at least 3 beds per 1000 examined. It is hoped and anticipated that a considerable proportion of these cases, having been discovered at an early stage, will be suitable for artificial pneumothorax treatment, which after preliminary induction in a sanatorium can be continued at the local Tuberculosis Dispensary.

The treatment of the unilateral sputum-negative case without symptoms, but in whom the radiograph, clinical signs, and B.S.R. suggest active infiltration without cavitation, calls for different treatment, and Evans does not advise immediate admission to a sanatorium. Such cases should be kept under close observation and radiographed at two-monthly intervals for the first year and every six months for two years. The bilateral, symptomless, sputum-negative case should, if the bed situation permits, have a preliminary period of sanatorium treatment.

Cases of inactive tuberculosis discovered in the R.A.F. survey numbered 387 (330 men and 57 women). These were cases of parenchymatous disease, calcified or fibrotic, including healed Assmann type of foci, but not including Ghon's foci or calcified hilar glands. Evans⁵ records that the majority of these were kept in the R.A.F. in a lowered category unless the extent of the disease was such that, in spite of the apparent healing, it was considered that the airman or airwoman was liable to break down under conditions of stress. Up to the time of his article, Evans records that well under 1 per cent of cases classified as inactive had broken down since their preliminary radiographs, but as the units had only been working for one year, it is early to make a dogmatic statement.

Brooks⁴ deals with the same problem, and the experience in the Royal Navy is of great importance. Those cases in which some doubt was entertained as to the activity of the lesion were discharged to what is called Category C, and this type of case is the one which presents the most difficulty as regards treatment. Hospital treatment followed by further observation seemed the only sound available method, and consequently such persons were, after discharge from hospital, given light duty on shore and were re-examined after an interval of time suitable to the case, often one of three months. The fate of this group is of special interest for, as Brooks remarks, it is this group in the civilian population which will cause the greatest clinical and administrative difficulties: 189 such cases have been re-examined after three months' light duty on shore, and 59, i.e., roughly one-third, were found to have evidence that the disease was not inactive as previously thought but active and progressive. In another third, inactivity of the disease was proved and these were returned to full duty, and in the remaining one-third some doubt still remained and these were given a further period of shore duty. From a consideration of the age-groups of these persons, the proportion of those who broke down was highest in the younger age-groups, and the older the person with inactive tuberculosis the more likely would his disease remain inactive.

Dealing with the question of 'carriers' of tuberculosis, Brooks thinks that the incidence of far-advanced pulmonary tuberculosis is greater among the older examinees, and quotes evidence that this fact is probably true of the civilian population also. As he puts it, these patients are the tough survivors of the army of the tuberculous, and if mass radiology is to be of value in detecting these comparatively fit members of the community but who are tuberculous, it must be extended to the older as well as the young age-groups. Lastly emphasis is laid on the importance of periodic re-examination of the younger age-groups.

In this country, up to the end of 1943 mass miniature radiography of the chest has been employed as a means of detecting unsuspected cases of pulmonary tuberculosis among members of the Forces, and the experience gained thereby will be of the greatest value, as the method is now being extended to certain sections of the civilian population. This will bring new problems and the profession will await with interest the results of the first civilian surveys.

REFERENCES.—¹*Memorandum 266/T of the Ministry of Health*; ²"Advisory Report on the Working of a Mass Radiography Unit," *Ministry of Health Report*; ³*Memorandum 268/Med. of the Ministry of Health*; ⁴*Proc. R. Soc. Med.* 1943, **36**, 155; ⁵*Brit. med. J.* 1943, **1**, 565; ⁶*Tubercle*, *Lond.* 1943, **24**, 63.

[¹ and ² may be obtained on application to the Ministry of Health; ³ is published by H.M. Stationery Office.]

MASTOIDITIS.

F. W. Watkyn-Thomas, F.R.C.S.

Ligation of both Jugular Veins for Suppurative Mastoiditis.—There is a general impression that ligation of both jugular veins is very dangerous and usually fatal. Maurice G. Evans¹ examines the available evidence and finds that this is not true. In his own case a boy of 8 had bilateral mastoiditis with a swinging temperature and severe left-sided headache. On the evidence the left jugular was tied and the left lateral sinus opened. No clot was found and the sinus bled freely from both ends. Two days later there were choked discs, a slowing pulse, a cerebrospinal-fluid pressure of 600 with normal fluid, and the Tobey-Ayer test showed blockage of both sinuses. The right lateral sinus was then explored and a clot removed. The sinus was packed and the right jugular was tied. Next day the child was semiconscious, the pulse was slow and irregular, the swelling of the discs had slightly increased, but the cerebrospinal-fluid pressure had fallen to 200. After that the patient made an uninterrupted recovery. The choking of the discs did not entirely disappear for two years. Eleven years after operation the patient was rejected for the Navy only on account of the poor vision in the left eye, but old school records showed that this had been as bad before operation.

In the literature there are 8 other cases of bilateral involvement of the sigmoid sinuses secondary to suppurative mastoiditis. In 2 of these both jugulars were tied. Both these cases recovered, with complete restoration of vision. In 1 there was moderate dilatation of the superficial veins for two weeks. In the other 6 cases, although both sinuses were obliterated, only one jugular was tied. All the patients recovered with good vision. In 4 cases no signs of intracranial or circulatory disturbance were noted; in one case there were choked discs, which cleared up without any impairment of vision; in one there was slight twitching of the left arm for a few hours.

Seven cases are reported by general surgeons who found it necessary to tie both jugulars. In 3 the patients died: one during the operation, one without recovering consciousness, and one on the third day. In this last case a month elapsed between the two ligations. Of the 4 who recovered, in one case the full record is not available. All the other three showed some degree of puffiness or cyanosis of the face, which soon disappeared.

This shows that the danger of the operation has been enormously exaggerated. Of 16 patients, 3 died, 12 completely recovered, and in one the final result is unknown. Temporary papilledema and a variable amount of venostasis are the only complications observed.

REFERENCE.—¹*Ann. Otol. etc.* 1943, **51**, 615.

MEASLES.

H. Stanley Banks, M.A., M.D., M.R.C.P., D.P.H.

Epidemiology.—The year 1942 was not a measles year. Notifications in England and Wales numbered 286,341 compared with 409,715 in 1941 and 409,521 in 1940. Deaths in 1942 were 458 compared with 1145 in 1941 and 857 in 1940. This represents a substantial reduction in the death-rate per 1000 of population from 0.021 in 1940 and 0.028 in 1941 to 0.011 in 1942.¹ So significant a reduction is probably to be attributed in part, at least, to improved use of sulphonamides in prophylaxis and treatment, but other factors such as clinical mildness associated with a non-epidemic period would almost certainly be operative.

Prophylaxis.—

1. *Measles Virus.*—Measles virus grown on the chorio-allantois of the developing chick embryo is likely to be the subject of much experiment in the immunology of measles during the next few years. It may be used as an antigen for a serological test of antibody in the human subject, and it may be used for prophylactic inoculation against measles. J. Stokes jun. et al.² of Philadelphia inoculated 250 supposedly susceptible children with this antigen by intranasal drip, inhalation, or intradermal or subcutaneous injection. Typical but extremely mild measles resulted in most of the inoculated children. This suggested that the antigen was an attenuated virus; it did not regain its virulence by a single human passage through several contact control children. There were no significant differences in the reactions to the different routes of inoculation, to two different methods of preserving the virus material, or to different dilutions of the inoculum. E. P. Maris et al.³ observed 22 virus-inoculated children who were exposed by chance to measles up to one year after their inoculation. Typical measles developed in 3, mild measles in 1, extremely mild measles in 3, and no disease in 15. Similarly 24 virus-inoculated children were injected with blood from patients with active measles. Typical measles developed in 3, mild measles in 2, extremely mild measles in 5, slight nasopharyngitis in 1, and no disease in 13. Control children and monkeys developed the disease typical for their species. These experiments indicate that 40 of the 46 children inoculated with this virus were apparently protected, completely or partially—a promising start for this work.

The advantage of virus inoculation over serum prophylaxis of measles is that it can be applied at any convenient time, without waiting for exposure to the infection.

2. *Dried Human Serum.*—A. C. McGuinness et al.⁴ obtained good results in the prophylaxis of measles in susceptible children, at the time of exposure to the infection, by use of vacuum-dried convalescent measles serum or adult serum. The advantages of dried over liquid serum are (a) it keeps its potency indefinitely, and (b) it can, if necessary, be injected as a concentrated serum by redissolving the powder in less water than the original serum contained. These advantages should make the dried sera, when obtainable, the products of choice in the kind of prophylaxis for which convalescent and adult serum are employed, i.e., to immunize susceptible contacts in children's wards, etc.

REFERENCES.—¹*Summary Rep. Min. Hlth.* 1943, 47, 48; ²*J. Amer. med. Ass.* 1943, **122**, 201; ³*Ibid.*; ⁴*Amer. J. med. Sci.* 1943, June, 826.

MECHANICAL SKELETAL FIXATION IN WAR SURGERY.

T. P. McMurray, F.R.C.S.

Bradford and Wilson¹ describe and recommend the use of a method of treatment of fractures of any of the long bones by the mechanical immobilization of the fractured bone without employing at the same time recumbency of the patient. They give as their reasons for their advocacy of this method the many difficult problems which are encountered in the treatment of these fractures in war areas, the impossibility of obtaining the highest degree of immediate and prolonged skilled care of the fracture, the frequent presence of infection at the site of fracture, and the necessity for transport at an early date. For these and other reasons the authors believe in the necessity of providing a more efficient and radical method of treatment, which to some extent renders continuous skilled supervision unnecessary.

The method recommended by them follows closely on the work of Roger Anderson, who has previously laid down the rules necessary for the employment of this technique. The claims advanced for the method are the ease of reduction and immobilization of the fractured bone, and the great advantage that, having completed the fixation of the fractured bone, it is possible to allow the patient to walk about from the very earliest date, even when the fracture involves the femur or the tibia. If such freedom can be given to a patient suffering probably from many injuries, prolonged recumbency with its possible complications of pressure sores can be avoided, and as the fractured bone alone is immobilized rigidity of the neighbouring joints need not be feared.

In treating a fracture of the femur by this method two strong pins are inserted into the shaft of the bone, above and below the fracture line. These pairs of pins are placed obliquely into the substance of the bone, the points of the pins in the bone being closer together than the outer extremities, which remain some considerable distance from the surface of the skin. When the pins have been inserted, they are firmly gripped in the special clamp by which reduction of the fracture and immobilization can be accurately completed and observed under radiological control. When the reduction has been completed, and the fractured bone surfaces are accurately opposed, the pins can then be immobilized by the use of a retentive metal bar, or by the application of a plaster case encircling the limb and fixing the pins. (*Plate XXI.*)

This method was introduced to this country by the staff of the American Hospital in Britain, and, as a result of the experienced gained in that Hospital, the authors have arrived at certain conclusions, of which the most important are:—

1. Mechanical pin fixation offers very definite advantages in war surgery.
2. Under certain circumstances mechanical pin fixation may be recommended as a routine treatment for femoral fractures.
3. The results of the series of patients treated, so far as these could be observed, justify a more extensive use of mechanical skeletal fixation.

The method, like most other radical procedures, has certain disadvantages, and is not without dangers, of which the most obvious is the development of infection of the bone at the point of insertion of the pins, which are subjected to frequent and considerable stress, and the irritation caused by the movement of skin and muscular tissues against the rigid pins. In order to avoid these complications as far as possible, various rules are laid down as to the method to be employed in the operative and post-operative handling of the patient. Thus, the most rigid asepsis is essential in all stages of the operation, and, according to the authors, the danger of errors in this connection arises largely from the obvious simplicity of the method. Secondly, the insertion of the pin into the bone must be complete—in other words, the pin must pass not only through

PLATE XXI

MECHANICAL SKELETAL FIXATION IN WAR SURGERY

(C. BRADFORD AND P. D. WILSON)

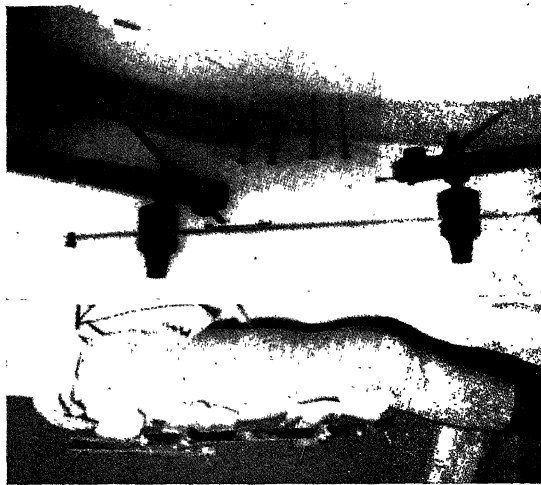


Fig. 4.—The photograph shows antero-lateral line of incision for bone-grafting a fractured femur which was 6 months old and showed no sign of union. Pins were inserted postero-laterally—out of the way of the operation. Radiograph shows ilial bone-graft in place. Solid union occurred in 4 months, during which time the patient was ambulatory.



Fig. 5.—Snapshots of patients wearing mechanical fixation apparatus. The patient on the right had a fractured tibia and fibula as well as femur.

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the near but also through the far cortex of the bone. Unless this is done full stabilization of the bone cannot be secured, whilst, in addition, movements of the pins if inadequately secured may cause irritation and invite infection. In the reduction and retention of the fracture, care must be exercised to prevent distraction of the fractured surfaces. The danger of this is illustrated by the prolonged delay in union which occurred in one patient in the series under review.

In the post-operative care, it is necessary to avoid frequent changes of the dressing round the site of the pin insertion. As a rule there is a small amount of discharge at these sites, and it is important that the dressings should be applied so lightly that they do not interfere or obstruct the outflow.

In the paper the authors very wisely point out the possible disadvantages which may follow the widespread use of this technique, and state, "We must be sure the pretext of emergency conditions does not lead us into the fatal error of adopting an easier method rather than a better method." A further salutary warning is given to the unthinking and inexperienced enthusiast when it is stated that, like any other method of treatment, its success depends entirely on the judgement and skill of the surgeon who employs it, for no matter how mechanical it may appear, it cannot pretend to convert the art of surgery into a machine trade. As the authors also very wisely point out, it is unfortunate that, on account of the difficulty of assessing end-results in war surgery, it has been impossible to give detailed figures which alone can give an accurate presentation of the value of this method, which must still be considered as definitely under trial.

REFERENCE.—¹*Surg. Gynec. Obstet.* 1942, 75, 468.

MEDICINE IN RELATION TO SHIPWRECK. (See also COLD, EFFECTS OF.)

A. E. Barnes, M.B., F.R.C.P.

An authoritative Memorandum¹ on the preservation of life at sea after shipwreck has been published by the Stationery Office, is readily available, and need not be summarized here. There are, however, some very important pathological and therapeutical problems in relation to shipwreck which can usefully be treated under this heading. They may be described under the following heads: (1) Blast injuries; (2) Immersion injuries; (3) Boat diseases.

Immersion Blast Injuries.—These are injuries produced by blast in water. Most of the cases have resulted from the sinking of escort vessels which carry depth charges on deck. These charges have necessarily to be kept ready for discharge, with fuses set to explode automatically at a predetermined depth. The crew who are swimming about in the water are subjected to a peculiar form of trauma. D. P. King and J. C. Goligher² suggest that 20 to 30 yards is the danger zone, but L. S. Austin and J. H. Willard³ say that the chances of anyone within 100 yards are very slim.

The first symptom was a *sudden abdominal pain* at the time of the explosion. The pain lasted for a varied time but in most cases had ceased before rescue so that it was possible to swim about. Willard and Austin say that within half an hour several violently explosive bowel movements take place with the passage of liquid stools into the sea. Some of their cases also are described as having felt an influx of sea water into the bowel. [Other writers do not mention this.] Most of Goligher's cases when rescued could walk about, but they soon had a recurrence of abdominal pain, which was sharp and cutting and aggravated by movements of the abdominal wall. In some there was urgency of desire to defæcate and sometimes to micturate. In only one case was there blood in the stool. Some had signs of blast injury to the lung. The future course varies according to the degree of injury; many of them show perforation of the intestine.

Pathologically, the important features are: (1) Intramural hæmorrhages and perforations, usually in the small intestine; (2) The solid viscera are not ruptured. Treatment depends upon the diagnosis of perforation and this diagnosis is difficult. It is stated that the classical sign of loss of liver dullness is only present in those cases which are so severe as to be beyond doubt. The causation of perforation is not yet clearly explained. Willard and Austin have adopted a simple theory suggested by the history obtained from their patients, of water entering the anus and of subsequent fluid evacuations into the sea, and ascribe the lesions to forceful compression of the abdomen simultaneously with the entrance of sea water into the bowel through the unprotected anus. They also found most of the perforations to be in the colon and not in the small intestine. Another explanation is more complicated: The compression wave of an explosion through water, unlike that through air, has no second low-pressure phase, but passes through the immersed animal body as it does through water. When the compression changes phase from water to air, the surface of the water is violently thrown off, like the surface spray over an exploding depth charge, and produces the injury. E. R. P. Williams⁴ has developed this theory and published experiments, and G. R. Cameron, R. H. D. Short, and C. P. G. Wakeley⁵ injected air into the peritoneal cavity of a rat which was afterwards submitted to submerged shock with the result that the liver and spleen underwent extensive laceration.

In other experiments, M. T. Friedell and A. M. Ecklund,⁶ and F. C. Greaves and colleagues⁷ have experimented with protective devices and suggest a protective device to be added to the life jacket.

Immersion Foot.—The next danger in northern latitudes is what has become known as 'immersion foot'. Very interesting contributions have come from C. C. Ungley and W. Blackwood^{8, 9} and Raymond Greene¹⁰ in Britain, and James C. White¹¹ in America. Immersion foot must be distinguished from frostbite. R. Greene maintains that in frostbite the essential change is capillary damage due to stasis. The result is complete necrosis of tissue often with a well-defined border. To produce frostbite the tissue must be actually frozen, which is not the case in immersion foot. C. C. Ungley gives a very full description of immersion foot (and hand) under the more technical designation of peripheral vaso-neuropathy after chilling. The essential pathology seems to be a fairly extensive nerve degeneration due to chilling, and resulting in sensory loss and (a) motor, (b) vasomotor, and (c) sudomotor paralysis. There is very little gangrene, if any, though serious results may ensue from infection. Factors favouring the onset of the condition are sea water temperatures of 5°–8° C. for 22 hours; footwear protects during a short exposure, but later causes pressure and injury. Immobility and body cooling promote the injury. It is interesting to learn that previous susceptibility to chilblain is not predisposing. The clinical features are: (a) Whilst still in the water, numbness and later swelling. The colour varies. After rescue there is (b) The prehyperæmic stage for a few hours to days; the foot is cold, numb, pulseless, and swollen. This is followed by (c) The hyperæmic stage, lasting 6 to 10 weeks; the skin is hot, congested when the foot is hanging, pale when elevated. Swelling increases, with tingling, throbbing and pain which is severe, and may be worse when the limb is dependent, as well as on coughing, yawning, micturition, and defecation. It is relieved by cold. There is also loss of sensation to pin-prick, cotton-wool, and vibration. Joint sense is often retained. Motor weakness and absence of sweating are frequent. Blisters, ulcers, gangrene, and infection may occur. (d) The post-hyperæmic stage; this lasts weeks or months, exhibiting cold sensitivity, giving rise to Raynaud's phenomenon which may persist for hours after return to a warm room after exposure to cold. Swelling recurs on walking; overaction of sensory

function and of the perspiration mechanism are troublesome features. Prophylaxis is laid down in the M.R.C. Memorandum.

TREATMENT.—Once rescued, the feet must be treated like glass, and the man should be carried. He should be stripped, and wrapped in blankets with the affected extremities exposed to the air. They must on no account be warmed, not even washed with lukewarm water, for warmth increases the oxygen requirements of the tissues which cannot be met by the depleted blood-supply. When hyperæmia supervenes, the pain is relieved by cold (dry) applied by means of icebags, fans, or a specially designed cabinet.¹⁰ Surgical interference should be reduced to a minimum—i.e., treatment of gangrene, and avoidance of infection.

(See also articles FOOT, SURGERY OF; IMMERSION FOOT.)

Boat Diseases.—Other dangers are dehydration and malnutrition on long boat journeys. In an interesting review of the condition of the crews of two lifeboats adrift for 16 or 17 days in warm latitudes, J. C. White¹² draws attention to (1) the œdema of the legs, (2) the neuritic symptoms, tingling and pain, and (3) the mouth lesions of the survivors. The paradox of œdema occurring in severely dehydrated patients suggests that better emergency rations might improve the conditions so that the fluid locked up in the œdema can be mobilized for vital purposes. The œdema is probably due to hypoproteinæmia, as this was demonstrated 24 hours after rescue. It is possibly ascribable to the fact that the men could not eat their hard rations on account of dry mouths, and suggests that smaller rations of softer protein foods might be better. He also suggests that his patients suffered from vitamin deficiency, and asks that in future, attention should be paid to this possibility, and cases examined to determine the facts. One partial remedy was discovered by his cases, that gentle swimming movements alongside the lifeboat were decidedly beneficial. The alleged possibility of treating dehydration by the rectal administration of sea water has again been positively disproved by experiments on volunteers as shown by R. F. Bradish and his colleagues.¹³

REFERENCES.—¹*War Memorandum* No. 8, *Med. Res. Coun. Lond.*; ²*Lancet*, 1943, 2, 119; ³*J. Amer. med. Ass.* 1942, 121, 995; ⁴*Brit. J. Surg.* 1942, 30, 38; ⁵*Ibid.* 49; ⁶*U.S. Navy med. Bull.* 1943, 41, 353; ⁷*Ibid.* 339; ⁸*Lancet*, 1942, 2, 447; ⁹*Ibid.* 1943, 1, 681; ¹⁰*Ibid.* 1942, 2, 695; ¹¹*New Engl. J. Med.* 1943, 228, 211; ¹²*Ibid.* 241; ¹³*J. Amer. med. Ass.* 1942, 120, 683.

MELANOMAS, MALIGNANT, OF THE EXTREMITIES.

Lambert Rogers, M.Sc., F.R.C.S.

From the Mayo Clinic¹ comes an important report of a series of cases of melano-epithelioma of the lower extremities. During a period of 24 years 155 such cases passed through the clinic, and 107 of these provided sufficient data on which to base prognosis and evaluate methods of treatment. Melano-epithelioma has a predilection for the lower extremity (76·7 per cent of the series occurred on the legs). The type of primary lesion was variously described by the patients: 40 stated the original lesion was a "mole"; 25 a "tumour"; 20 described it as a black, brown, or purple spot, 12 an ulcer or abrasion, 3 a "blood blister", and 3 as a tumour which had arisen in a callus. Enlargement of the primary lesion was the most frequent type of onset noted. Forty-one of the 107 patients complained of some associated pain. As the tumour enlarged, the surface became friable and was prone to bleed when irritated; 58 of the patients had an ulcerating lesion when they first reported. W. H. Bickel, H. W. Meyerding, and A. C. Broders,¹ who report these cases, conclude from the examination of the results of treatment that when possible wide excision of the lesion and of any suspicious lymphatic nodes (at the time of first reporting 41 patients had discernible metastases in addition to the primary lesion) offers the patient as favourable an outlook as does amputation. When a digit is involved, however, amputation is the procedure of choice. Of the patients

treated by excision, 29.8 per cent survived for 5 years or more. None of the patients in that group in which irradiation was the only form of treatment survived 3 years, but the authors of this paper point out that this form of treatment should not be condemned, as advances in radiology may yet prove it of more benefit than is apparent at present.

REFERENCE.—¹*Surg. Gynec. Obstet.* 1943, **76**, 570.

MENINGITIS, OTITIC. (See OTITIC MENINGITIS.)

MENTAL DISORDERS. (See also NEUROSES AND PSYCHOPATHOLOGY; SOCIAL ASPECTS OF PSYCHIATRY; WAR PSYCHIATRY.)

MENTAL DISORDERS IN CHILDREN. Aubrey Lewis, M.D., F.R.C.P.

R. S. Lourie, B. L. Pacella, and Z. A. Piotrowski¹ have studied 15 boys and 5 girls whose ages ranged from 4 to 12 years and who had psychotic attacks considered to be *schizophrenic*. The children were examined on the average 8 years after the onset of the attack. One-fifth of the children had recovered completely, one-quarter of them had gone to pieces. These children showed disturbances in every field, including the vegetative, motor, perceptive, intellectual, emotional, and social. There had often been from infancy some aberration in one or other of these fields, though in the 4 children who had apparently recovered completely there was no history of severe disturbances before the acute outbreak. The children who had done badly were physically infantile, and showed autonomic instability, abnormal motor behaviour (e.g., awkwardness or athetotic movements), anxiety associated with resignation, and lack of interest in their surroundings. Neither the Rorschach test nor the electro-encephalogram proved applicable to the estimation of prognosis, though in the children who had done badly there was an almost continuous high amplitude alpha rhythm over all regions. Lourie and his associates are disposed to agree with P. Schilder's² view that syndromes which resemble schizophrenia in childhood are very often not schizophrenic but organic; but they would distinguish symptomatic from genuine schizophrenia in childhood—an important proviso.

D. Hubble,³ in a lively discussion of the nature of the *rheumatic child*, emphasizes the concurrence of nervous excitability and infection. 'Growing pains' he regarded as indicating a difficulty in growth of personality rather than in growth of stature. He denies, however, that the nervous instability of the rheumatic child is related to neurosis, which he regards as a qualitative, rather than a quantitative, deviation from normal.

The effects of *cerebral injury* in children have been investigated by E. Guttman and H. Horder.⁴ It was found that there was a much higher incidence in children than in adults of early fits, i.e., fits occurring within the first week or month after injury. In the acute stage emotional symptoms were more to the fore than clouded consciousness or intellectual loss. A post-concussional syndrome was observed in 10 per cent of the cases; its occurrence depended on external factors rather than on the degree of cerebral injury. The commonest symptom was irritability. Intellectual deterioration was rare in this series of cases; the only patient who showed a falling-off in his school work after the accident suffered from traumatic epilepsy. Persistent behaviour disorder was also infrequent among the children studied.

REFERENCES.—¹*Amer. J. Psychiat.* 1943, **99**, 542; ²*Ment. Hyg.* 1935, **19**, 329; ³*Brit. med. J.* 1943, **1**, 154; ⁴*Arch. Dis. Childh.* 1943, **18**, 139.

MENTAL DISORDERS: TREATMENT AND CAUSATION.

Aubrey Lewis, M.D., F.R.C.P.

There is a large output of papers on *physical methods of treatment*.

Leucotomy.—L. H. Ziegler¹ has collected from 18 centres in the United States and Canada the results of bilateral frontal leucotomy, carried out upon 618 mentally disordered patients; schizophrenia, depression (especially involutional in type), and obsessional disorder predominated. 12 of the patients had died of the operation, and 18 subsequently. 8 were clinically worse after the operation, 62 were clinically unimproved, 109 slightly improved, 194 much improved, and 214 recovered; in one case it was said that not only did the symptoms disappear but the patient was better than at any previous time in his life. 277 of the patients are still known to be in hospital, and 60 are outside hospital but unable to work; 251 are outside hospital and are working. Intellectual impairment has not been common. Many patients who had previously been difficult to care for in public institutions have become more manageable though still insane; 3 of the patients have been taken into the military forces, and 1 patient has since operation worked at a highly technical occupation which he had not previously engaged in. Ziegler remarks that the earliest reports of the effects of insulin and convulsant therapy were over-encouraging, and he suspects that the same factors may be at work in the above statistics; he thinks, however, that the method deserves a good trial over the next 5 to 10 years.

G. W. Fleming and W. McKissock² report 15 patients treated by frontal leucotomy, 12 of whom were melancholic. Most of the latter were of good prognosis and have done well. M. C. Petersen and H. F. Buchstein³ obtained much improvement in 16 cases, and moderate improvement in 11, out of a series of 29, and E. Rizzatti and G. Borgarello⁴ reported 31 per cent improved. E. L. Hutton⁵ had 50 cases, one of whom died from cerebral hæmorrhage caused by accidental section of the anterior cerebral artery; it appears that improvement is most likely where apprehension, anxiety, or guilt is a prominent symptom; after the operation the patients were complacent and rather indifferent about the future; most success was obtained in intelligent patients whose relatives would help to re-educate them; about two-fifths of the patients have been able to leave the mental hospital. W. Freeman and J. W. Watts⁶ conclude, on the basis of 136 patients whom they have treated by the method, that the operation interrupts the connection between the frontal lobe and the thalamus, thus diminishing painful emotional reactions; intelligence is unharmed, but the patients may become indolent and tactless. Many, however, reach their pre-psychotic level of occupational adjustment. Failures are due to an operation which is either inadequate or too extensive, or to the presence of pronounced aggressive traits in the patient's personality, or to emotional deterioration. Old people whose lives are a burden to themselves because of depression are particularly good subjects for the operation, becoming serene afterwards. The best results are observed in obsessional tension states, and good results occur in involutional depression. G. Heilbrunn and P. Hietko⁷ have observed the effects of bilateral frontal leucotomy in 10 chronically disturbed schizophrenics who were subject to periods of excitement. They were unable to confirm the satisfactory result reported by E. A. Strecker and his associates⁸; two of the patients died, one of severe bronchopneumonia, the other of hæmorrhage in the right frontal lobe; only two patients have shown any amelioration of their condition; among the remainder, one has become more restless and combative than before the operation; he has also had repeated convulsions, which began two months after it. G. W. Kiska⁹ provides an interesting review of the psychological effects of the operation. Defects in abstract and categorical thinking may occur, though there is no important intellectual defect demonstrable. The

picture obtained by the Rorschach procedure depends more upon the pre-psychotic and pre-operative personality of the subject than upon the specific destruction of frontal brain tissue by the operation.

Shock Therapy.—In two reports, L. S. Penrose^{10,11} has described a new statistical method of evaluating 'shock' therapy in mental illness. He finds that fewer patients treated in this way remain in hospital than would otherwise be the case, and that this benefit from shock treatment is pronounced in cases diagnosed manic-depressive and involuntal psychosis, but very slight in cases diagnosed schizophrenia. [He does not make a detailed analysis of the separate results of insulin and convulsant therapy.—A. J. L.]

At a meeting of the Philadelphia Psychiatric Society nine contributors to a symposium¹² reported the complications and contra-indications of *electrical convulsion therapy*; they had treated in all more than 3000 patients. There were considerable divergencies in the proportion of complications observed; these probably rested in part on different standards of selection, and on methods of detection. Thus one psychiatrist who had treated 1133 cases had observed only 6 with compression fracture of the thoracic vertebræ, whereas another had 5 such fractures in 120 patients treated. W. C. Menninger¹³ describes how a woman of 47 whose circulatory system had previously been normal, developed hypertension after chemical convulsant therapy; her blood-pressure has remained high during the ensuing four years.

It is now generally accepted that convulsant therapy is not particularly beneficial for schizophrenia. L. Reznikoff¹⁴ has observed 100 schizophrenic patients treated by electric shock; he did not allow his patients to have more than 15 fits at most at one course of treatment; 68 of the patients were unimproved, and there was a pronounced tendency to relapse. These results were much the same as Reznikoff had obtained with a chemical convulsant in a similar group of schizophrenics.

The satisfactory results obtained in middle-aged and elderly persons whose melancholia, or other affective disorder, is treated by convulsant therapy, are confirmed by V. L. Evans,¹⁵ who has thus treated 40 manic-depressive or involuntal patients; he also treated 6 schizophrenics and 4 neurotic subjects. All the patients were over 50 years of age; 40 of them recovered or improved enough to go home.

In 1942 B. J. Alpers and J. Hughes,^{16,17} G. Heilbrunn and A. Weil,¹⁸ and other writers reported pathological changes in the central nervous system after electric shock (*see* MEDICAL ANNUAL, 1943, p. 125). F. G. Ebaugh, C. H. Barnacle, and K. T. Neuburger¹⁹ report two men aged 57 who died after electrical convulsions. In one death occurred from coronary occlusion; in both there were widespread, though not serious, histological lesions in the brain. The glial changes were attributable not to the seizure but to the action of the electric current on the brain. The authors consider that death was due to cardiac and respiratory disturbance, though careful examination, including electrocardiograms, had been made before the treatment was instituted and had shown nothing abnormal in the chest. They question whether the treatment should be given to elderly patients, particularly if there is evidence of cardiac involvement. [This conflicts somewhat with the general view that it is in elderly persons with affective disorders that convulsant treatment is chiefly efficacious, as well as fairly safe.—A. J. L.]

M. M. Harris and B. L. Pacella²⁰ have used *acetylcholine chloride* to produce therapeutic fits in a small series of patients with mental disorder; their method had first been used by A. M. Fiamberti.²¹ As the loss of consciousness was always associated with cardiac arrest lasting 30 to 50 seconds, the method is unsuitable for further use.

J. S. Gottlieb and P. E. Huston²² compare the results of treating schizophrenia by *insulin* with more conservative methods for the same illness. They do not find that the recovery or the remission rate differs appreciably in the two groups. Separate analysis of the course of the illness in each of 198 patients during the ensuing four years was made; the insulin and the control groups showed about the same proportion of good and bad outcome. [The insulin method employed by Gottlieb and Huston had been judged less effective by T. D. Rivers and E. D. Bond²³ than a more intensive method in which the insulin dose was increased above the insulin level. The paper, however, emphasizes how reactionary is the view that the alternatives for the schizophrenic are only 'shock treatment' and no treatment; it should be read in conjunction with the paper by W. Malamud and N. Render,²⁴ showing how valuable conservative methods of treatment can be in schizophrenia, when they are energetically and skilfully employed.—A. J. L.]

L. Kalinowsky and T. J. Putnam²⁵ decided to try the effect of *dilantin*, in maximal doses, on schizophrenic and other non-epileptic psychoses. They treated 60 patients, 41 of whom were schizophrenic. The more disturbed of these, e.g., with catatonic excitement, responded well during the period the drug was administered; similar results were obtained with manic patients. The authors conclude that since improvement, characterized by diminution of excitement and irritability, occurred in over half the patients during the period of treatment, *dilantin* has a purely symptomatic action on states of excitement, no matter what the psychosis. The improvement was maintained for half a day after administration of the drug had ceased, but the effect could be repeated. Kalinowsky and Putnam compare the improvement to the similar effect of *dilantin* on excitement and aggressiveness in epileptics.

Psychiatric Disorders incident to Life in the Tropics.—These are often loosely grouped as 'tropical neurasthenia'; it is, however, widely recognized that this is an unfortunate term which should be given up. Not that psychiatric disorders are rare among illnesses of white men in the tropics, but they can be more accurately classified. J. L. McCartney²⁶ of the United States Navy examines the problem. He points out that residence in the tropics sooner or later lowers the blood-pressure and the basal metabolic rate in many persons; and quotes G. Riemerschmid²⁷ and D. B. Dill et al.,²⁸ who hold that failure of the heat-regulating mechanism may lead to hyperpyrexia with consequent damage to nerve-cells. McCartney describes many neurotic symptoms, especially concerned with sexuality and alcoholism. Psychiatric syndromes and epilepsy may arise from schistosomiasis or ankylostomiasis; many symptoms suggestive of neurosis will occur in and after tropical diseases such as trypanosomiasis and, of course, malaria. T. R. Hill²⁹ found that among 500 consecutive European admissions to a tropical hospital, 50 showed disabling neurasthenic symptoms. Persons receiving appointments in the tropics should, he considers, be examined psychiatrically to exclude those of unstable personality.

Mild Depression.—B. Andratschke and C. H. Rogerson³⁰ have surveyed 100 consecutive cases of mild depression. The previous personality of the patients was found to fall into one or other of three groups—over-conscientious, pessimistic, or cheerful; precipitating factors, mainly psychological, were found in 82 per cent of the cases, and the war as a source of chronic stress had played an indirect part in 26. Half the patients had had previous attacks of depression.

The diagnosis before admission had often been "anxiety neurosis", and complaints of anxiety and agitation were prominent. Andratschke and Rogerson obtained good results by electric shock therapy; the patients were in most cases relieved by 3 to 8 convulsions. Although convulsion therapy did not prevent

the recurrence of depression later on, mental hygiene measures had considerable prophylactic effect.

REFERENCES.—¹*Amer. J. Psychiat.* 1943, **100**, 178; ²*Lancet*, 1943, **1**, 361; ³*Amer. J. Psychiat.* 1942, **99**, 426; ⁴*Schizophrenie*, 1938, **7**, 241; ⁵*Lancet*, 1943, **1**, 362; ⁶*Bull. N.Y. Acad. Med.* 1942, **18**, 794; ⁷*Amer. J. Psychiat.* 1943, **99**, 569; ⁸*Ibid.* 1942, **98**, 524; ⁹*Ibid.* 1943, **100**, 180; ¹⁰*First Report on the 1938-1941 Shock-treated Cases in the Ontario Hospitals*, 1943; ¹¹*J. ment. Neurol.* 1939, **67**, 270; ¹²*Arch. Neurol. Psychiat.* 1943, **49**, 266; ¹³*Amer. J. Psychiat.* 1941, **98**, 382; ¹⁴*Ibid.* 1939, **95**, 1039; ¹⁵*Arch. Neurol. Psychiat.* 1943, **49**, 414; ¹⁶*War Med.* 1943, **3**, 351; ¹⁷*S. Afr. med. J.* 1941, **15**, 267; ¹⁸*Amer. J. trop. Med.* 1941, **21**, 261; ¹⁹*Lancet*, 1943, **1**, 332; ²⁰*Brit. med. J.* 1943, **1**, 780.

MIGRAINE.

Macdonald Critchley, M.D., F.R.C.P.

Medical Treatment.—L. S. Trowbridge, T. J. C. von Storch, and M. Moore¹ have lately tried to evaluate the various drugs used for the relief of migrainous headaches. They have found, as have others, that ergotamine tartrate is the most efficacious drug for the majority: thus out of 600 attacks of migraine, 90 per cent were ended by this means. Indeed the authors speak of ergotamine tartrate as a "specific" against migraine.

They then asked their patients to name the drug or drugs which they had used at various times to relieve their headache, and to report the results obtained. The results were summarized in the following table:—

COMPARATIVE EFFECT ON MIGRAINE HEADACHE OF VARIOUS DRUGS.

DRUGS	NO. OF PATIENTS	INVARIABLY COMPLETE RELIEF	FREQUENTLY ADEQUATE RELIEF	USUALLY INADEQUATE RELIEF	INVARIABLY UNOBTAINED RELIEF
		per cent	per cent	per cent	per cent
Vasoconstrictors	54	80	7	4	9
Narcotics	41	44	12	10	34
Barbiturates	25	20	16	12	52
Analgesics	186	16	19	12	53
Gastro-intestinal	25	16	8	24	52
Bromides	25	8	20	4	68
Endocrines	15	7	0	7	86
Patent nostrums	29	4	14	10	72

The vasoconstrictor group comprised caffeine and ergotamine (both orally and hypodermically). Narcotics were morphine, pantopon, codeine, and scopolamine. The first of these was completely effective in 59 per cent of those who tried it. Barbiturates included phenobarbital, pentobarbital, and allonal. Of these the first helped 16 per cent of patients. [Phenobarbital is not as a rule effective in relieving an actual attack of migraine; its merit lies in the prevention of subsequent attacks when taken regularly.—M. C.] Analgesics included acetanilide, aspirin, amidopyrine, and phenacetin. Aspirin helped 10 per cent of the 186 patients who gave it a fair trial. The 'gastro-intestinal' group of remedies included dilute hydrochloric acid, sodium bicarbonate, and Seidlitz powders. Of these the last seemed best, helping 18 per cent of the users. Laxatives were reported as "fairly helpful" by 4 of the 7 patients trying them. [A small series, but the results would appear to be second only to ergotamine.—M. C.] Among the bromide group, Bromo-Seltzer was slightly better than the others—but the group as a whole was relatively ineffective. Endocrine therapy comprised thyroid, theelin, progynon, hormotone, and anterior pituitary extract. Only one patient was satisfied with the relief obtained, namely, from pituitary extract. [Endocrine therapy was never expected to be a means of checking an actual attack of migraine.—M. C.]

The author's series contains no results from the use of vitamin B₁ therapy (H. D. Palmer²) or of oxygen inhalation (W. C. Alvarez and A. Y. Mason³).

Surgical Treatment.—Some cases of migraine are so intense, so protracted, so frequent, and so intractable, that patient and medical man alike are driven to desperate measures in their search for relief. It is not surprising therefore that neurosurgeons have embarked upon the dangerous waters of the management of a case of chronic "migraine major". All the more so when the patient in his or her distress has uttered the plea "if only they could open my head"—the family doctor by the time reaching the end of his therapeutic tether. Some measure of support is obtained from the knowledge—or rather belief—that migrainous headaches cease after certain intracranial surgical measures. Thus ablation of the Gasserian ganglion for trigeminal neuralgia is said to cause a cessation of any coincidental migraine—whether carried out by alcoholic injection or by surgical removal. Even simple trephination—without any further intracranial interference—has been stated to bring about a cure. Thoraco-cervical sympathectomy, too, has been said to have incidentally relieved patients with migraine. We are also reminded of Dickerson's operation of ligation of the middle meningeal artery for cases of intractable migraine.

G. F. Rowbotham⁴ has lately revived interest in the surgery of migraine and the role of the trigeminal nerve in the production of the headache. Few, however, would concur with his dictum that "in migraine, as in other painful conditions, before treatment can be instituted the clinician must have some conception of the nature of the disturbance which initiates the pain cycle, of the site at which the painful impulses arise, and of the anatomical pathways by which painful impulses are conveyed to the brain." Rowbotham subscribes to the common conception that the pain of migraine arises in the arteries of the scalp and dura, though he concedes that there may be other factors as yet unknown. He describes three cases, in women of 40, 25, and 48, suffering from long-standing headaches. In all three a partial section of the trigeminal root was carried out. Relief was obtained in the first two, but in the case of the third, after some months, migrainous pains began to appear in the other side of the head. The second patient, too, developed an attack of headache three or four years later in the side of the head which had been operated upon—the mechanism of the pain-impulse being unexplained. The first patient, though relieved of her migraine properly speaking, would occasionally suffer from "pains in the right side of the forehead in the form of hot stabs." Here again, it is not easy to visualize the anatomo-physiology of the pain in the side of the head where root section had been performed: if *some* pain can continue after root section, there seems no adequate reason why migrainous pains should not continue or recur.

The weaknesses of the case for trigeminal root section are: (1) In migraine the attacks of pain rarely affect the same half of the head on every occasion and hence unilateral section would seem inadequate in most cases; (2) In migraine the pain commonly spreads to areas outside the trigeminal zone, e.g., the back of the head, the ear, neck, or even shoulder; (3) Migraine is a disease which commonly abates or ceases in the fifth decade, or after the menopause; (4) Psychiatric features are highly important in migraine, as a part of the personality make-up and also as a precipitant—root section would seem inadequate to change this aspect of the problem; (5) An attack of migraine is accompanied by numerous manifestations other than pain, e.g., vomiting, giddiness, malaise, coldness, teichopsia, irritability, depression, and many others. Indeed migraine without headache is a well-recognized entity. Root sections would be unlikely to relieve these concomitant features, unless they could be shown to be secondary to the actual headache. The case for root section as a cure for migraine cannot as yet be considered proven.

REFERENCES.—¹*New Engl. J. Med.* 1942, 227, 699; ²*Arch. Neurol. Psychiat.* 1941, 45, 368; ³*Proc. Mayo Clin.* 1940, 15, 616; ⁴*Brit. med. J.* 1942, 2, 685.

MUSCLE HERNIÆ.*Lambert Rogers, M.Sc., F.R.C.S.*

J. D. Kitchin and D. A. Richmond¹ have reported 3 cases of multiple herniations of the tibialis anticus muscle in soldiers (*Fig. 23*) undergoing strenuous training in rough hilly country. Previously reported cases have occurred among those who inhabit mountainous districts such as Alpine soldiers, but these have been instances of solitary herniation of one or both anterior tibial muscles, while the cases reported by Kitchin and Richmond appear to be the first recorded examples of multiple lesions. The herniæ were small, about the size of a pea, and disappeared when the muscle contracted, leaving no palpable thickening. Defects



Fig. 23.—Multiple muscle herniæ. (By kind permission of the 'British Medical Journal'.)

in the aponeurosis could be felt distinctly as rounded openings with quite sharply defined edges. Of the 3 cases, all of whom were infantrymen, the first had 3 herniæ in the left leg situated over the belly of the tibialis anticus, the second had 13 of the right and 4 of the left leg, and the third had 2 of the right leg. All three patients had been referred to hospital because of aching pains attributed to varicose veins, which, however, were found to be present only in the first case. The presence of these herniæ with aching pains in the legs calls for a modification of the strenuous activity with which their appearance would appear to be associated. Their incidence and precise significance, however, are at present unknown. [It will be of interest to note whether war activity reveals more examples, particularly in commando and task forces.—L. C. R.]

REFERENCE.—¹*Brit. Med. J.* 1943, 1, 602.

MYASTHENIA GRAVIS. (*See also* THYMUS GLAND.)*Macdonald Critchley, M.D., F.R.C.P.*

Abnormalities of the Thymus.—At the present time myasthenia gravis is generally regarded as the result of some disorder at the myoneural junction

whereby impulses are imperfectly transmitted. Nevertheless explanation is still required of the morbid anatomical observation of the association with tumours or enlargement of the thymus. C. Weigert¹ in 1901 was probably the first to record a thymic tumour in a case of myasthenia gravis. Other such reports followed, so that by 1917 E. T. Bell² had been able to collect a significant body of post-mortem data. Out of 56 cases of myasthenia gravis (which have come either to autopsy or to the operating table) 27 displayed anomalies of the thymus. In 10 of these a thymoma was reported, while the other 17 were instances of hyperplasia. In 1936 E. H. Norris³ continued this study, and, including Bell's 56 cases, brought the total up to 80. He considered that the finding of thymic abnormalities depended upon the thoroughness of the search. A. Blalock, M. F. Mason, H. J. Morgan, and S. S. Riven⁴ continued this study, with the result that out of 110 autopsies or operations upon patients with myasthenia gravis, 53 cases of thymic anomaly came to light. Thirty-one of these were neoplastic, and 22 were regarded as persistence or hypertrophy of the thymus.

J. A. Lievre⁵ found that the average weight of 24 thymic tumours in myasthenia gravis was 60 g., the mean diameter being 5 cm. Their usual site was the anterior mediastinum immediately behind the sternum, and in contact with the upper part of the pericardium. The majority of the tumours were benign. Bell thought that the thymic tumours formed a distinct group. Blalock and his colleagues believed that up to 1939 there had only been one case of myasthenia gravis recorded in which there was a malignant thymic tumour: this was F. Meggendorfer's case, reported in 1908.⁶

Schumacher and Roth⁷ in 1913 seem to have been the first to remove an enlarged thymus in a case of myasthenia gravis. Other cases have since been written up by H. Haberer,⁸ H. Adler,⁹ R. A. Obiditsch,¹⁰ and Blalock et al.

Miller,¹¹ in 1940, found thymic abnormalities in 4 out of 5 fatal cases of myasthenia gravis. His paper was published subsequent to the review by Blalock and collaborators.

A. M. Harvey, J. L. Lilienthal, and S. A. Talbot¹² studied the physiology of the neuromuscular activity and the effects of prostigmin and acetylcholine in 5 patients with myasthenia gravis after total thymectomy. Marked changes had occurred, and in addition there was an "extraordinary clinical improvement" in 3 patients. They conclude that in some cases of myasthenia gravis the thymus plays an important part in pathogenesis, and that after thymectomy there seems to be an increase in the amount of transmitter substance available at the neuromuscular junctions.

F. Turnbull¹³ has recently recorded a case of thymic tumour in myasthenia gravis which he regards as malignant (carcinoma). The dramatic clinical improvement after operation is contrasted with the little if any benefit which resulted from the removal of a normal or hyperplastic—as opposed to neoplastic—thymus.

Twelve cases of thymectomy for myasthenia gravis have lately been published by J. Carson.¹⁴ Three patients died after operation; three have been cured and remained well for 9, 6, and 3 months respectively after operation; three have improved; two patients have shown no change; one patient could not be traced. Carson could find no clinical or pathological distinction between the cases which did well after operation and the failures. It is interesting to note that 3 of the 12 cases had a thyrotoxicosis.

Details of surgical technique for the removal of a thymic tumour were given by G. L. Keynes¹⁵ and by R. L. Galloway¹⁶ in the discussion which followed Carson's paper.

REFERENCES.—¹*Neurol. Zbl.* 1901, 20, 597; ²*J. nerv. ment. Dis.* 1917, 45, 130; ³*Amer. J. Cancer*, 1936, 27, 421; ⁴*Ann. Surg.* 1939, 110, 544; ⁵*Pr. med.* 1936, 44, 991; ⁶Quoted by Bell²; *Cancer*, 1936, 27, 421; ⁷*Mitt. Grenzgeb. Med. Chir.* 1913, 25, 746; ⁸*Arch. klin. Chir.* 1917, 109, 193; ⁹*Ibid.* 1937, 189, 529; ¹⁰*Virchows Arch.* 1937, 300, 319; ¹¹*Arch. Path.* 1940, 29, 153; ¹²*J. clin. Invest.* 1942, 21, 579; ¹³*Arch. Neurol. Psychiat.* 1942, 48, 938; ¹⁴*Proc. R. Soc. Med.* 1943, 36, 140; ¹⁵*Ibid.* 142; ¹⁶*Ibid.* 143.

NASAL CONDITIONS AND HEADACHE. (See HEADACHE AND NASAL CONDITIONS.)

NASAL INTUBATION: RHINOLOGICAL DANGERS AND DIFFICULTIES.

F. W. Watkyn-Thomas, F.R.C.S.

A. R. Dingley¹ admits freely the value of nasal intubation for anæsthesia in throat and ear surgery, but remarks that "it is unwise to regard every patient as possessing a nose which is a safe channel for the passage of a tube, or all types of case as being suitable for nasal intubation."

Hæmorrhage, sometimes considerable, can be caused by too much force being used in a narrow nose, or by attempting to push past an obstruction. *Infection* may follow abrasion of the mucosa, or may be caused by faulty asepsis. If the mucosa is damaged, withdrawal of the tube from the infected nasopharynx over the abraded area may be the cause of later sepsis with hæmorrhage, antral infection, and perhaps otitis media or secondary hæmorrhage from the tonsil area. *Adhesions* between septum and turbinals may result from the damage to mucosa.

As *contra-indications to nasal intubation*, Dingley mentions: (a) Large sharp spurs, gross septal deformity, marked turbinal hypertrophy (particularly in tonsillectomy or septic pharyngeal states), pus, crusts, large polypi, and alar or vestibular infections. (b) Septicæmia or grave toxic states; if intubation is done, the oral route is better. (c) Tubes which have slipped into the œsophagus are probably infected and should not be withdrawn or reinserted through the nose, particularly if there is any bleeding. (d) A history of recurrent nasal sinusitis. (e) Cases in which one side of the nose is being operated on, particularly if there is infection. (f) Tonsil and adenoid cases in children; here the oral route is preferable. Lastly, if the operation and anæsthesia can be carried out efficiently by other methods, "nasal intubation is not the preferable route rhinologically."

As *precautionary measures* he advises:—

1. Sterilization of hands, tubes, instruments, and lubricants.
2. Spraying the nose with cocaine and examination with a headlight before passing the tube.
3. No attempt to force a passage, and sulphanilamide ointment locally if there is much bleeding.
4. Removal of all clot from the post-nasal space and throat before removal of the tube.
5. If it is known that the mucosa has been damaged the tube should be removed through the mouth, not through the nose.

REFERENCE.—¹*Brit. med. J.* 1943, 1, 693.

NAUSEA AND VOMITING, EPIDEMIC. (See EPIDEMIC NAUSEA AND VOMITING.)

NEUROSES AND PSYCHOPATHOLOGY. *Aubrey Lewis, M.D., F.R.C.P.*

In an exhaustive statistical analysis of 2000 neurotic soldiers, E. Slater¹ has examined the social data, physical and sexual constitution, affective and intellectual characteristics, earlier environmental stresses, precipitating factors, symptoms, outcome, and treatment. Tetrachoric correlation coefficients were calculated in a random group of 400 cases to determine the degree of association

of certain personality traits with their corresponding symptoms. It emerged that obsessional symptoms are firmly rooted in a basis of specific predisposition; hysterical and paranoid symptoms are also related to constitutional proclivities, but to a lesser extent than obsessional ones. Further correlations supported Slater's hypothesis that neurotic constitution and poor intelligence account for almost all the congeries of symptoms which make up neurotic disorder.

The psychological treatment of *groups* of mentally ill persons would be economical and advantageous if the results were as good as those obtained by customary individual methods. J. Bierer² has encouraged patients in a mental hospital to meet in a club where he could influence them for therapeutic ends: he considers the procedure a valuable one. M. Jones³ has described how military patients with "effort syndrome" can be benefited by group talks on health problems, which will counteract the misunderstandings prevalent among them regarding the origin and nature of their illness. Jones trains the nursing staff to aid in this plan of treatment.

A common assumption about *hysteria* would warrant the conclusion that *suggestibility* is more prominent among hysterics than among other neurotic persons or normal ones. H. J. Eysenck⁴ tested this by means of the "body-sway" method devised by Clark Hull, and other tests, and did not find that the expectation was correct. The tempo and tendency to perseverate in hysterics was also examined, and it was found that in neither of these respects did they differ from other neurotic subjects. Suggestibility is correlated with intelligence; the form of suggestibility measured by body-sway, arm levitation, and the Chevreul pendulum tests is chiefly found in subjects of average intelligence; neither the dull nor the highly intelligent are particularly suggestible. Eysenck⁵ has also examined the relationship of suggestibility to hypnosis.

A. Paterson^{6, 7} points out the selective effect of various types of brain lesion upon the higher forms of cerebral function concerned in conscious activity. Limitation of the "background" specific to a particular function is a striking feature of the disturbance in cerebral disease and trauma.

W. Mayer Gross⁸ made an investigation designed to throw light on *retrograde amnesia* by the study of disturbed memory occurring after an artificially produced convulsion. In his psychotic patients thus treated the amnesia was shown more often in recalling than in recognizing information about recent events; in the majority of the cases it lasted less than one minute.

The study of *muscular tension* is of considerable interest to the psychiatrist. J. Ruesch and J. E. Finesinger⁹ have utilized, with slight modifications, well-known methods of measuring the pressure that is used during the continuous movement of handwriting. They found that patients with mental disturbance gripped harder, and took longer to write a standard sentence, than normal people. The pressure exerted by the hand when writing was, however, not correlated to subjective feelings of general tension.

P. C. Livingstone and B. Bolton¹⁰ examined the *night visual capacity* in 50 neurotic patients; those with an anxiety state obtained a low score, and the average in the 50 cases was 9.6, against an average score of 19 in 6000 normal R.A.F. personnel.

REFERENCES.—¹*J. Neurol. Psychiat.* 1943, **6**, 1; ²*Lancet*, 1943, **2**, 799; ³*Brit. med. J.* 1942, **2**, 276; ⁴*J. Neurol.* 1943, **6**, 22; ⁵*Proc. R. Soc. Med.* 1943, **36**, 349; ⁶*Lancet*, 1942, **2**, 717; ⁷*Proc. R. Soc. Med.* 1943, **36**, 573; ⁸*Lancet*, 1943, **2**, 603; ⁹*Arch. Neurol. Psychiat.* 1943, **50**, 439; ¹⁰*Lancet*, 1943, **1**, 263.

OBESITY.

Sir Walter Langdon-Brown, M.D., D.Sc., F.R.C.P.
Samuel Leonard Simpson, M.A., M.D., F.R.C.P.

L. H. Newburgh¹ examines the apparent enigma of the association of obesity with normal or increased basal metabolic rates and with average food intake;

nor can the acquisition of adiposity be attributed to a lessened specific dynamic effect of food, because the latter is normal or raised in the adipose. The author records the experience of von Noorden and Grafe that in most carefully regulated and controlled human experiments an adipose patient may, after an initial reduction of weight, by drastic dieting, and fluid restriction, with or without thyroid medication, fail to continue to lose weight on a regime which, according to all physical mathematical conception, should invariably result in continued progressive loss of weight. He confirms such observations from his own experience. Study of the assessable loss of heat and weight, taking account of the evaporation of water from the skin and lungs, gave no clue. Water balance studies showed that the stage of failure to lose weight was associated with water retention, but this also occurred in control subjects on similar diet, and is regarded as a normal "by-product of under-nutrition."

Von Bergmann suggested that adiposity is caused by a hereditary constitutional trait of the adipose cells that enables them to accumulate excessive amounts of fat. Hetenyi postulated that fat once deposited in the tissues of an obese person is prevented from leaving them, and so cannot be used as fuel, increased appetite being the natural response. He supported his hypothesis by two facts: (1) Higher blood-fat concentrations are found in the obese on a normal diet; (2) Small increases in blood-fat after a fatty meal occur in the obese compared with normal people. Newburgh's data contradict point (1), and he interprets the second point as due to increased combustion of fat. Against the theory of resistance of fat to mobilization he points out that fat people, in contrast to normals, do not develop a negative nitrogen balance on a semi-starvation diet. He is forced to the conclusion that "These many painstaking investigations of the metabolism of obese persons have failed to disclose any abnormal process that accounts for the accumulation of the fat. On the contrary, they have demonstrated that obese persons produce more heat in the basal state, that they expend more energy to perform a measured amount of work, and that their total heat production is greater than that of normal persons of similar age, height, and sex under the same circumstances. Since they are unable to absorb more energy from their food, they must eat more than normal persons simply to avoid loss of weight."

In the second part of his paper, the author examines, and fails to incriminate, the endocrine glands as a direct cause of obesity. He also does not accept the hypothalamus as a cause since the response to hypothalamic lesions in the monkey is negative as regards adiposity. He cites Danforth's strain of obese mice, where obesity is associated with hereditary bulimia.

As regards treatment, he concludes, in spite of his negative findings, that the basis of treatment is a controlled subnormal diet.

REFERENCE.—1 *Arch. intern. Med.* 1942, 70, 1033.

ŒSOPHAGUS, CONGENITAL ATRESIA OF, WITH TRACHEO-ŒSOPHAGEAL FISTULA.

Sir John Fraser, M.Ch., F.R.C.S.Ed.

In a review of congenital atresia of the œsophagus contributed in the last edition of the *MEDICAL ANNUAL* (p. 234), it was remarked that up to date there was no instance recorded of successful reconstruction of this serious congenital anomaly, but it was suggested that sooner or later patience and ingenuity would bring their reward, and events have shown the forecast to be correct.

C. Haight and H. A. Towsley¹ have succeeded in reconstructing the œsophagus when that organ was the site of a congenital atresia combined with a tracheo-œsophageal fistula. It is a remarkable record, and doubtless the success will stimulate others to persevere.

PLATE XXII

CONGENITAL ATRESIA OF THE ESOPHAGUS WITH TRACHEO-ESOPHAGEAL FISTULA

(C. HAIGHT AND H. A. TOWSLEY)

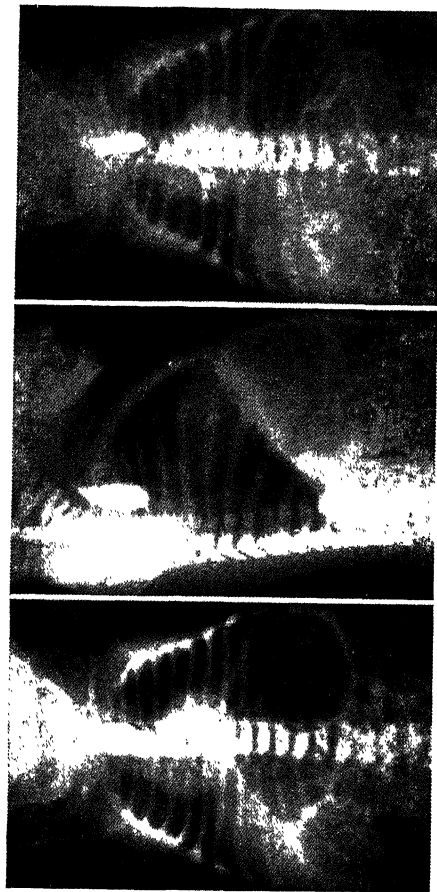


Fig. A.—a, b, Frontal and lateral radiographs following the ingestion of lipiodol, showing the blind dilated upper esophageal segment. The stomach and intestines are distended with air, indicating the presence of a tracheo-esophageal fistula. c, Taken one hour later. Retained lipiodol is seen in the upper esophageal segment. Some of the lipiodol has overflowed into the trachea and bronchi, and a small amount has entered the stomach by way of the tracheo-esophageal fistula.

Plates XXII–XXIV reproduced from ‘Surgery, Gynecology, and Obstetrics’

PLATE XXIII

CONGENITAL ATRESIA OF THE ŒSOPHAGUS WITH TRACHEO-ŒSOPHAGEAL FISTULA—continued

(C. HAIGHT AND H. A. TOWSLEY)

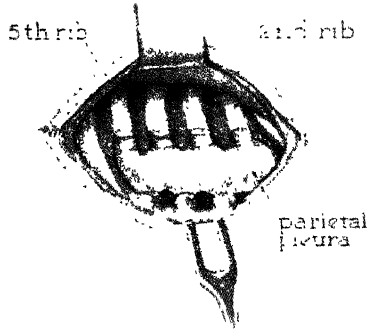


Fig. B.—The drawing illustrates the extent of the costal resections. The posterior and posterolateral portions of the 2nd, 3rd, 4th, and 5th ribs have been resected and the intercostal muscles, vessels, and nerves, and periosteal beds have been divided to expose the parietal pleura.

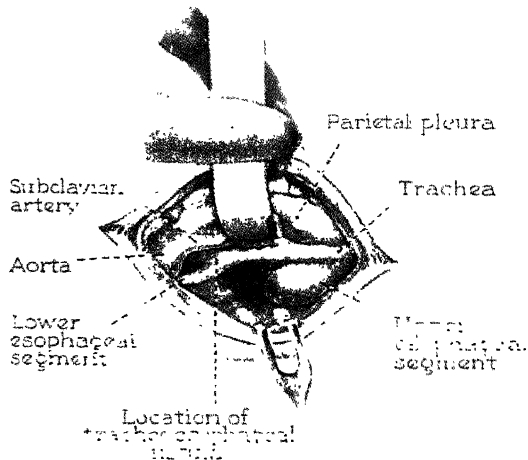


Fig. C.—Diagrammatic drawing to illustrate the left extra-pleural exposure of the anomaly. The parietal pleura has been separated from the thoracic wall. The subclavian artery is being retracted forward, exposing the upper œsophageal segment. The uppermost intercostal artery has been ligated and divided to allow the descending portion of the aortic arch to be displaced forward. The origin of the lower œsophageal segment is seen. The drawing shows an exposure of the entire operative field, whereas at operation it is possible to obtain an exposure of only a portion of the operative field at any one time.

PLATE XXIV

CONGENITAL ATRESIA OF THE ŒSOPHAGUS WITH
TRACHEO-ŒSOPHAGEAL FISTULA—*continued*

(C. HAIGHT AND H. A. TOWSLEY)

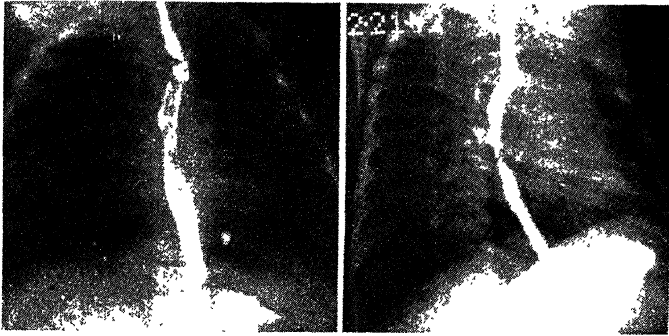


Fig. D.—X-ray examination 11½ months after operation. There is no dilatation of the upper portion of the œsophagus. The lumen of the œsophagus at the level of the stricture is larger than in *Fig. A* and is considerably less curved.



Fig. E.—Photograph of patient 11½ months after operation

It will be recalled that the anomaly consists of a blind upper oesophageal segment and a lower segment communicating with the trachea; the two parts may be completely dissociated or there may be a semblance of continuity in the shape of a fibrous union.

There are two reasons why any prolonged existence is incompatible with the error—starvation, and the flooding of the air-passages with the secretion which accumulates in the upper oesophageal pouch. The success of operation depends upon the ability to correct these consequences, and it is apparent that the procedure adopted must re-establish oesophageal continuity and close the tracheo-oesophageal fistula. Many suggestions have been put forward, a summary of them being reported in the review referred to, but it is agreed that the ideal consists in an end-to-end anastomosis of the proximal and distal oesophageal segments and a closure of the fistula. This ideal has been achieved by Haight and Towsley, and, so far as the reviewer is aware, this is the first and only time that it has occurred.

The patient was a female child twelve days old. The error was recognized twenty-four hours after birth, and it is worthy of note that the infant was transported by automobile 500 miles in order that expert surgical attention might be obtained. Throughout the long journey the local physician (Dr. Cooperstock) arranged for a relay of colleagues to attend the baby in order to provide fluid administration parenterally—a remarkable tribute to the forethought and high ethical standard of the American physician. The operation was carried out at the University Hospital, Ann Arbor, Michigan. Access to the atresia and fistula area was obtained by resection of the posterior portion of the 2nd, 3rd, 4th, and 5th ribs, and after displacement of the parietal pleura, the upper oesophageal pouch and the tracheo-oesophageal fistula were exposed. The fistulous segment was divided between ligatures, and afterwards an end-to-end anastomosis was established between the oesophageal segments. The post-operative period was one of many anxieties; for some weeks a fistulous communication with the oesophagus persisted, necessitating a temporary gastrostomy, but ultimately healing occurred, and two years later the child was to all intents and purposes a healthy individual. (*Plates XXII–XXIV.*)

It was a remarkable achievement, and, if there was an element of good fortune, the real truth is that success is attributable to the meticulous organization, high technical skill, and no small degree of courage on the part of the surgeons concerned.

The important thing is that successful operation has been shown to be possible, and, if it can be carried out on one occasion, there is no reason to doubt that it can be repeated. The profession is grateful to those who have demonstrated its feasibility.

REFERENCE.—¹*Surg. Gynec. Obstet.* 1943, 76, 872.

ŒSOPHAGUS, LOWER, AND CARDIAC END OF STOMACH, CARCINOMA OF.

A. Tudor Edwards, M.Ch., F.R.C.S.

The hopeless attitude for so many years adopted to carcinoma of the lower oesophagus and adjacent portion of the stomach has within the last few years undergone an appreciable change, chiefly from the increasing number of reports of patients successfully treated by operation. In fact it may be definitely asserted that the likelihood of successful and prolonged recovery after resection of the oesophagus, i.e., complete removal, is more certain than in gastric carcinoma as a whole. The reason for this is that the growth remains localized until a late stage. In autopsy records of 51 patients at St. Bartholomew's Hospital recorded by R. W. Raven¹ (1931) metastases were not found in 21 per cent; similarly A. Zupping² (1936) reported on 57 autopsies with absence of metastases in

33·3 per cent, and W. L. Watson³ (1936) recorded secondary deposits in about 50 per cent of cases in the Memorial Hospital, New York.

Thus as regards metastases alone it would appear that at least 25 per cent should be operable. The chief factor responsible for inoperability, as for mortality, is the involvement of adjacent structures such as the aorta or the left main bronchus, or direct infiltration and perforation into pleura or lung. E. S. J. King⁴ (1936) records 2 operable cases in 25 successive cases, although several were explored. J. H. Garlock⁵ (1940) found 70 per cent operable of those subjected to thoracotomy, i.e., 7 patients out of 10 for œsophageal carcinoma; on the other hand, in 15 patients with adenocarcinoma of the cardia Garlock⁶ (1941) found 5 operable (33·3 per cent). Hence the stress commonly laid by the surgeon on the two points that early diagnosis is the most important factor and that attention should be paid to any variation in the process of deglutition. Although sometimes patients present themselves with evidence of secondary deposits as the first manifestation of their disease, neglect of the early symptoms either by the patient or practitioner is the chief factor in missing the operable stage.

Incidence.—The question will arise whether the incidence of œsophageal cancer is sufficient to warrant serious consideration. H. S. Souttar⁷ (1927) states that the incidence of cancer of the œsophagus apart from that of the cardiac end of the stomach is 4·6 per cent of all carcinomas, and that 1600 patients die of œsophageal cancer annually in England and Wales. Renaud⁸ (1924) in Switzerland found that 10 per cent of all carcinomas involved the œsophagus, which figure reached 16·2 per cent when only males were considered. In the United States, F. L. Hoffman⁹ (1934) found the mortality exceeds 2000 per annum. Another interesting observation by Hoffman is that the incidence of carcinoma of the œsophagus has almost doubled from 1915 to 1932 (from 1 per 100,000 to 1·7 per 100,000). In the English figures the proportion of males to females is 3 to 1. In France, J. Guisez¹⁰ (1935) quotes 4 males to 1 female.

Site.—The larger proportion of cases of carcinoma of the œsophagus occur in the middle and lower segments; for instance, H. H. Janeway and N. W. Green¹¹ (1910) in 1670 cases report that 85 per cent of lesions occurred in these situations. Other authorities put the relative incidence at 73 per cent and 75 per cent.

Signs and Symptoms.—Probably the earliest symptom of carcinoma of the lower œsophagus and cardiac end of stomach is discomfort and a burning sensation beneath the lower end of the sternum. This is followed by occasional difficulty in the swallowing of solids and may give rise to spasmodic pain. In many, however, little pain is felt even when obstruction becomes more obvious. Later, patients find it impossible to swallow solids, and semi-solids provide difficulty. Weight loss is always a feature of carcinoma of the œsophagus, and is due not to toxæmia but to the difficulties of deglutition and the relative starvation. Where the cardiac portion of the stomach above the incisura is affected obstructive symptoms occur late, and nausea and vomiting may be marked features.

Diagnosis.—Radiological examination is essential in any suspected œsophageal lesion. In the early cases obstruction may not be obvious unless the barium meal is rather thick and the technique for mucosal deformity used. Dilatation of the œsophagus above the growth is rare even when the obstruction is obvious. When the growth is filling a good deal of the œsophageal lumen barium may pass with difficulty, and as the length of the obstruction is some indication of operability, the patient should be partially inverted on the radiological table to determine the lower level by the barium running towards the growth from the lower end. In every case œsophagoscopy should be carried out to confirm the diagnosis by biopsy.

The greatest proportion of growths of the œsophagus are squamous-celled, but those extending into the œsophagus from the stomach are adenocarcinomas. Occasionally adenocarcinomas are encountered higher in the œsophagus, and the prognosis is invariably worse for they tend to metastasize to glands earlier than the squamous variety.

Bronchoscopy, which is advisable for growths in the upper two-thirds of the œsophagus, is unnecessary for those situated in the lower third. It may disclose fixation of the bronchial mucosa to the growth.

P. Santy, P. Bullivent, and M. Berend¹² (1942) advise thoracoscopy after induction of pneumothorax on the right side, through which they advise exploration for middle-third tumours.

TREATMENT

Radiotherapy.—Radiotherapy, either in the form of deep X-ray treatment or by the use of radium, has met with little or no success. In two cases treated by X-radiation at the Memorial Hospital, New York, the carcinoma was eradicated and disappeared, but death resulted from perforation and mediastinitis, the result of radiation.

I. T. Nathanson and C. E. Welch¹³ (1937), in a series of 297 cases, found that the average expectancy of life of the untreated patient was 7 months, of those treated by gastrostomy only 10.4 months, and of those treated by irradiation 9.3 months. Watson¹⁴ (1933) reported that the expectancies of life in cases treated by gastrostomy and external radiation was 6.3 months, gastrostomy and internal radiation 3.7 months, and gastrostomy combined with internal and external radiation 3.9 months. F. J. Cleminson and J. P. Monkhouse¹⁵ (1934) found the average survival after irradiation was 5.6 months. Many observers state that no single case has ever been cured by radium. The most ardent advocate of radiotherapy, Guisez¹⁰ (1936), has recently stated that its value is palliative only. Thus the problem with all its difficulties has again been thrown back to surgeons.

There can be no doubt that the disease as far as it concerns the œsophagus is relatively slow growing and confined to the wall of the œsophagus for a considerable time. The problem of the cardiac end of the stomach is of a different order, as the disease is very insidious in onset and in the vast majority of cases glandular involvement is present relatively early and secondary metastases to the liver are not uncommon.

Surgical Treatment.—In carcinoma situated above the lower third, resection of the growth necessitates the transplantation of the remaining upper segment of the œsophagus under the skin of the upper chest, where an œsophageal fistula is formed. This may be connected by means of a rubber tube with the stomach, which in some cases is retained permanently, whereas in others attempts are made to reconstruct an artificial œsophagus beneath the skin: a skin tube, or a tube formed from the greater curvature of the stomach or from a portion of small intestine with its blood-supply intact is resected and transplanted beneath the skin over the sternum and joined above with the œsophageal stump. All these methods have their disadvantages, such as the formation of fistulæ at their junctions.

In the lower third, and when the cardiac orifice is involved by carcinoma which is operable, reconstruction of the alimentary canal can be completed by œsophago-gastrostomy.

The majority of successful cases have been carried out in recent years, and the late results have still to be assessed in the future. Many individual cases of successful resections have been recorded from 1907 onwards, when Voelker¹⁶ (1908) performed the first œsophago-gastrostomy through the abdomen, and

was followed by two cases by Kümmel¹⁷ (1910). These three cases died of metastases after an unknown period. The first abdomino-thoracic operation was performed by J. H. Zaiger¹⁸ in 1913. In cases of resection of other portions of œsophagus the most successful was that of F. Torek^{19, 20} (1913, 1925), whose patient died from pneumonia 13 years after subtotal resection of the œsophagus, for carcinoma in the middle third. The first resections for carcinoma of the lower end and with restorations of continuity were performed by T. Ohsawa²¹ (1933).

During the period 1928–1933, 101 cases of carcinoma of the œsophagus, cardiac portion of stomach, and upper stomach involving the cardia were explored. Forty-three resections were carried out in the group: 5 for lesions in the middle third of the œsophagus, with no recoveries; 18 for tumours of the lower œsophagus and cardia, with 8 recoveries; and 20 for tumours of the stomach involving the cardia, with 12 recoveries. The latter were total gastrectomies. In all other cases of the last two groups the free costal margin was divided directly into the abdomen, a procedure causing much weakness of the chest wall until union is complete. The first successful case published and performed by the modern procedure of thoracotomy followed by radial incision of the diaphragm, mobilization of the stomach, and œsophago-gastrostomy was carried out by D. B. Phemister and W. E. Adams²² (1938) in the United States in January, 1938.

PREPARATORY TREATMENT.—Apart from the age of the patient, which is generally over 50 and not uncommonly over 60 years, the fact that patients are suffering from relative starvation is a very definite factor in the healing of wounds and the incidence of infection such as empyema and pneumonia. The water balance and to a certain degree the general nutritional balance can be controlled by the passage of a nasal tube into the stomach through which vitamins and the necessary mineral salts are given. Attention to oral hygiene by extraction or scaling of teeth, etc., is of prime importance in preventing inhalation pneumonia and in limiting sepsis around the growth. Lastly, transfusions of blood on one or more occasions according to the blood-count are essential as a pre-operative measure. The induction of artificial pneumothorax as a preliminary to operation is advised by many surgeons (H. Brunn and H. B. Stevens²³ (1937), E. S. J. King⁴ (1936), E. G. Muir²⁴ (1937), Tudor Edwards²⁵ (1935), et al.). It permits visualization of the adhesions to be expected and permits more steady anaesthesia. As has been mentioned, P. Santy et al.¹² (1942), who operate from the right side in middle-third tumours, also used thoracoscopy as a means of determining whether the tumour had invaded the lung root. In all cases of carcinoma of the lower third and upper stomach approach through the left pleura is essential.

The question of abdominal exploration as a preliminary is also debatable. J. H. Garlock⁵ (1940) considers it depends upon the nature of the growth; when adenocarcinoma is found on microscopy of a specimen removed through the œsophagoscope, he advises laparotomy first. If no contra-indications are found to operation the abdomen is closed and the chest opened at the same operation. E. D. Churchill²⁶ (1942) and A. Ochsner and M. de Bakey²⁷ (1941), also advocate abdominal exploration as a preliminary for examination of the glands along the lesser curvature of the stomach and the liver for metastases and the performance of gastrostomy if the condition is considered inoperable. It may be advisable in many cases to ligature and divide the gastrohepatic omentum up to the diaphragm and similarly to divide the gastrosplenic omentum before closing the abdomen. After seven days the chest is opened and the resection completed and an anastomosis made. R. B. Cattell²⁸ (1941) has performed 2 successful œsophago-gastrostomies by this method.

OPERATION.—

Anæsthesia.—This is an important factor in the success of the operation. The majority of surgeons emphasize the necessity of a highly skilled anæsthetist, and the majority of anæsthetists have employed cyclopropane, or, in some cases, ethylene combined with oxygen. Some have used local anæsthesia for the chest wall and continued with the gaseous anæsthetic as soon as the pleura is opened. The majority are against positive pressure anæsthesia, using sufficient control to steady the mediastinum. This can be obtained by a firm-fitting gas mask, but most surgeons prefer their anæsthetists to use intratracheal intubation in case both pleuræ are opened either deliberately or inadvertently. The risk of irritating the trachea and inducing a post-operative tracheo-bronchitis by the passage of an intratracheal tube is virtually negligible with a skilled anæsthetist.

Some surgeons get the anæsthetist to inflate the collapsed lung at intervals during the operation—C. Eggers²⁹ (1936), J. H. Garlock⁵ (1940). In their opinion this procedure improves the condition of the patient and helps to prevent post-operative pneumonia. T. Ohsawa²¹ (1933) believes that positive pressure is detrimental, although oxygen should be given throughout. In his view, in the human subject the loss of respiratory function on one side is sufficiently compensated by oxygen overventilation of the other lung, and return to normal respiratory and circulatory status throughout the body is more rapid after free thoracotomy than after the use of differential pressure.

The writer's view is that cyclopropane and oxygen administered through an intratracheal tube with controlled respiration is the ideal method in the present state of our knowledge. Before operation is commenced a cannula connected with a saline apparatus is introduced into the internal saphenous vein at the ankle. Soon after the operation is commenced blood is substituted for the saline and the rate of transfusion made to correspond with the rate of blood-loss.

Incision.—With the patient in the right lateral position a long incision is made over the 8th rib, which is resected forward from the transverse process of the corresponding vertebra, almost in its entire length.

The lower end of the oesophagus is palpated and the tumour defined. The pulmonary ligament is divided and the oesophagus dissected from its bed and held by a piece of tape passed around it. A radial incision from the oesophageal opening is then made in the diaphragm. The extent of the growth and the presence of glands along the lesser curvature of the stomach is determined after the lobe of the liver has been mobilized by division of the left hepatic ligament. If the condition is found to be operable, the left gastro-epiploic artery and vasa brevia are tied and the gastrolenal and gastro-hepatic ligaments are divided. By drawing the stomach to the left, the gastric artery is put on tension, exposed, and divided between ligatures. Some division of the gastro-hepatic omentum will allow the stomach to be displaced easily and high into the chest. When the lesion is primarily oesophageal, at least 1½ in. of normal oesophagus should be taken away above the limits of the lesion; similarly, in lesions of the cardia near the oesophagus it may be necessary to remove almost the whole of the lesser curvature to eradicate the growth. Before proceeding further the phrenic nerve is crushed as it passes from the pericardium on to the diaphragm.

Clamps are now placed across the stomach below the lesion and the stomach is divided and both ends carefully closed. Another clamp is placed across the oesophagus and the intervening portion removed. The oesophageal end is now attached to the stomach by a series of interrupted sutures inserted longitudinally in the oesophagus through muscular and submucous coats and in the stomach through the serous, muscular, and submucous layers. An incision is made in the stomach of corresponding length to the width of the oesophagus, and vessels in the submucosa are ligatured. Another layer of interrupted sutures is passed

through all coats of the œsophagus and stomach, forming the second posterior layer of the anastomosis. Anterior sutures are inserted in a similar way, and many surgeons wrap a portion of omentum around the anastomosis to ensure that the union is firm.

The stomach should be attached firmly to the ligaments on the front of the vertebræ by several silk or linen sutures so as to produce complete relaxation at the line of union, and the diaphragm is sutured to the stomach low down so as to prevent herniation of other abdominal contents into the chest. Areas of raw mediastinum should be powdered with sulphathiazole (about 3 g.) and an intercostal tube inserted. The lung is inflated, accompanied by suction through the tube, which is later connected to a suction apparatus or under-water drain.

POST-OPERATIVE CARE.—Almost all surgeons who have carried out successful œsophago-gastric resections insist upon complete restrictions of swallowing of any liquid by mouth for at least four to five days (Garlock, Phemister, Churchill, etc.). Similarly, most surgeons consider the retention of a Ryle's or similar tube in the œsophagus as detrimental, by pressure, to the firm healing at the junction of the œsophagus and the stomach. Garlock⁵ (1940) insists on a careful pre-operative explanation to each patient that nothing should be swallowed for several days after operation.

In many of the earlier cases a preliminary gastrostomy or jejunostomy has been carried out by the abdominal route, but the former certainly interferes with the free mobilization of the stomach at the time of the œsophago-gastrostomy, and S. F. Marshall²⁰ (1938) and T. Ohsawa²¹ (1933) always advise against this step if the patient's nutrition is good. W. H. Ogilvie³¹ (1938) performed gastrostomy after the anastomosis had been completed.

An intravenous drip of 5 per cent glucose in normal saline is given continuously for several days by Garlock, and when necessary further blood transfusions are given. Small sips of water are started by mouth on the fifth day and increasing fluid until the seventeenth day, when custards, jellies, cereals, etc., are given. Solid food should not be given until the third to fourth week. Oxygen should be given freely during the first few days, preferably by the Boothby mask or spectacle frame carriers, although in the earlier cases recorded patients were placed in an oxygen tent. With the object of limiting sepsis, all recent operators advocate the pre- and post-operative use of sulphonamides, and others apply a sterile powdered sulphonamide at the end of the operation to the local site.

POST-OPERATIVE COMPLICATIONS.—

Pneumonia and Atelectasis.—These are by no means uncommon complications of successful œsophagectomy. The majority of surgeons crush the phrenic nerve, and this has many obvious advantages especially in permitting complete rest to the anastomosis, but this procedure has been blamed for post-operative atelectasis—Ogilvie³¹ (1938). As phrenic crush has been carried out on many occasions without any such result it is doubtful whether it can be held responsible. Apart from the low state of nutrition so commonly present, attention to oral sepsis before operation is essential, and lastly complete expansion of the lung at the end of operation is advisable to dilate all alveoli.

Empyema.—Empyema has been recorded in a number of cases which have been successful following drainage; in these cases it has probably resulted from slight contamination at operation. In others, however, it has resulted in a fatal issue, and in these it almost invariably resulted from rupture of the growth during dissection of the œsophagus or, more commonly, from failure of union at the site of anastomosis. This complication can in almost every case be traced to tension on the junction at the end of the operation. It should be avoided by free mobilization of the stomach by division of the gastric artery, the left gastro-epiploic artery, the vasa brevia, and when necessary by removal of the

spleen. Furthermore, many surgeons suture the stomach to the periosteum of the vertebral bodies and ribs to diminish tension—W. E. Adams et al.³² (1938), B. N. Carter et al.³³ (1940), H. B. Stephens³⁴ (1942).

All patients recorded who have had a leakage at the anastomosis have died during the first few days after operation, although in one or two instances patients have survived for three weeks.

Perforation of Growth into Pleura or Bronchus.—As a result of dissection of the growth, perforation may result into the mediastinum and in some cases it may be possible to complete the resection. Such soiling will result in the formation of a highly toxic pyothorax, and often the condition is fatal. In others, resection of the œsophagus cannot be completed and the result is more likely to be fatal. In other cases, the growth is firmly attached to the left bronchus and may even infiltrate it. This excludes the possibility of resection, and perforation into the bronchus almost invariably leads to bronchopneumonia and death. This complication more especially applies to growths situated in the middle third, and it is probable that all patients with growths in this situation would be submitted to preliminary bronchoscopy—E. D. Churchill²⁶ (1942), E. S. J. King⁴ (1936).

Injury to Thoracic Duct.—Only one case of injury to the thoracic duct at operation has been recorded which led to a fatal result, death being due to persistently recurring bilateral chylothorax (H. B. Stephens³⁴—1932). If such a complication is recognized at operation ligature of both ends of the divided duct should be satisfactory, as anastomoses of the duct are numerous both with other lymphatic channels and with the veins. Stephens as a result of his fatal case advocates displacement of the aorta after ligature of three or four pairs of intercostal vessels.

Late Stricture of Anastomosis.—Several cases of stricture formation at the line of anastomosis have been recorded, some of which have been fatal—B. N. Carter et al.³³ (1940). In all cases of late stricture the lower end of the œsophagus has been ligatured and invaginated into the stomach. It was considered at one time that insufficient œsophagus had been invaginated, but experimental work by Carter et al.³³ (1940) has shown that direct suture of surfaces by interrupted sutures is not followed by stricture, and this is the method adopted by the majority of surgeons to-day. By direct sutures is meant the suture of free edges, with fixation sutures through the outer coats of the viscera. The anastomosis should always be of the end of the œsophagus to the anterior surface of the stomach (end-to-side anastomosis).

Regurgitation of Gastric Juice.—A common complaint of those recovering from resection of the lower end of the œsophagus and cardia is regurgitation of gastric juice. This occurs commonly at night and when patients adopt the horizontal position, and is due to the removal of the cardiac sphincter. It can be avoided by patients sleeping in the sitting posture, but there appears to be slow recovery from means at present unknown, and the disability is less worrying to patients the longer they live after operation.

RESULTS.—The accompanying table provides sufficient evidence that patients can be submitted to resection of the lower œsophagus and the upper part of the stomach, that the continuity of the alimentary canal can be restored by the operation of œsophago-gastrostomy, and that patients can survive operation and remain well for over four years.

The figures also show that the operation does not cause an undue operative mortality, and should encourage complete investigation of all cases of other than momentary difficulty in deglutition. It has been shown that no other treatment provides the same possibility of cure. It is extremely doubtful whether treatment by radiotherapy, either by radium or X rays, has ever produced a cure.

CASES OF CARCINOMA OF LOWER END OF OESOPHAGUS AND CARDIAC END OF STOMACH.

SURGEON	No. OF CASES	DATE	TYPE OF GROWTH	DIED FROM OPERATION	LENGTH OF SURVIVAL	CAUSE OF DEATH	OPERATION
Voelcker	1	1907	?	—	? months	Metastases	Abdominal oesophago- gastrostomy
Kummel	2	1909	?	—	? "	"	"
Zaiger	4	1913	?	—	? "	"	Abdomino- thoracic after thora- coplasty
Brun	1	1913	?	—	? "	"	Abdominal
Bircher	1	1918	?	—	Well 18 mths.	"	"
Gohrbrandt	1	1921	?	—	6 mths.	Intercurrent disease	"
Hedblom	1	1922	?	—	A few months	Suicide	Abdomino- thoracic after thora- coplasty
Küttner	1	1923	?	—	?	Metastases	Abdominal
Ohsawa	18	1933	Squamous	10	?	?	Semithoraco- tomic; transabdo- minal
Ohsawa	20	1933	Adeno- carcinoma	8	?	?	Thoracolapar- otomy
Muir	1	1936	"	—	?	—	Dorsal oeso- phago- gastrostomy
Adams and Phemister	1	1938	Squamous	—	—	—	Oesophago- gastrostomy
Garlock	5	1940	—	2	Died 12 mths. Well at 14 mths. 10 mths. 11 mths. 24 dys. 5 dys. Survival 3 yrs. 9 mths.	—	Oesophago- gastrostomy
	5	1940	Adeno- carcinoma	2	—	Metastases	Gastrostomy
E. D. Church- ill and R. D. Sweet ³⁵	11	1942	9 adenocar- cinoma 1 squamous 1 sarcoma	4	—	No late death recorded	Oesophago- gastrostomy
Walters	1	1942	Adeno- carcinoma	—	Well 2 mths.	—	"
Jonas	1	1942	"	—	?	—	"
Bonner	1	1939	Squamous	1	26 days	Leakage	"
Holman and Swain	2	1942	Adeno- carcinoma	—	5 mths.	Liver metastases	"
Cattell	1	1939	"	—	Well 5 mths.	—	"
Carter, Stevenson, and Abbott	2	1940	Adeno- carcinoma Squamous	—	Well 9 mths. Still well	Asthenia	"
Stephens	5	1941	Adeno- carcinoma	4	Recurrence 16 mths.	Infection and metastases	"
Phemister	4	1941	2 adeno- carcinoma 2 squamous	1	1 well 5 mths.	Shock 3 dys.	"
				1	1 well 4½ yrs.	Leakage 7 days	"
Y. K. Wu and H. H. Loucks ³⁶	6	1942	1 adeno- carcinoma 5 squamous	1	18 days 6 mths. 4 well 1-17 mths. 6 days	Mediastinal abscess Heart disease Pneumonia	"
Ogilvie	1	1938	Adeno- carcinoma	1	—	—	"
Ochsner and de Bakey	2	1940	"	1	Well 1½ yrs.	Pleuro- pulmonary infection	"
V. C. Thom- son ³⁷	1	1941	Squamous	—	Well over 2 yrs.	—	"
O. S. Tubbs ³⁸	1	1943	Adeno- carcinoma	—	Well 6 mths.	—	"
Taylor ³⁹	1	1943	Squamous	—	Well 8 mths.	—	Subcutaneous oesophago- gastrostomy
Marshall	1	1937	Adeno- carcinoma	—	Well at 8 mths.	—	Oesophago- gastrostomy
Steele ⁴⁰	1	1943	Squamous	—	Well at 5 mths.	—	"

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OESTROGENS, SYNTHETIC: THEIR USE AND POTENCY.

Clifford White, M.D., F.R.C.P., F.R.C.S., F.R.C.O.G.

J. P. Greenhill,¹ of Chicago, in a recent article gives his personal views on the uses of oestrogens and the results of some investigations regarding comparative dosage and toxicity of diethylstilbæstrol, hexoestrol, and '118 B' (Schieffelin and Co.).

As regards their uses, oestrogens have almost replaced all other methods of suppressing undesired lactation; they may facilitate induction of labour, particularly in cases of missed labour, if used in very large doses and especially if combined with pitocin. They may be of use in the treatment of uterine inertia. In gynecology, Greenhill lays stress on the use of oestrogens in lessening some of the distressing symptoms of the menopause and also in treating gonorrhæal vulvo-vaginitis, vaginal hypoplasia, senile vaginitis, and some cases of menorrhagia and dysmenorrhœa. He regards their effects as only temporary in cases of amenorrhœa, hypoplasia of the uterus, and mammary underdevelopment.

To test the potency of an oestrogen some investigators have examined the vaginal smears of menopausal women in a manner similar to that used on castrated rodents, but this method is not found to be satisfactory owing to the large variation in the state of the vaginal squamous cells found in different menopausal women. The results of the examination of scrapings of the endometrium obtained by the use of a small suction curette are quite unreliable owing to the great diversity of appearances which are found among scrapings obtained from different patients complaining of the same symptoms. This method is also irksome to the patients and onerous to the investigator. For these reasons Greenhill has chosen the subjective response of patients with menopausal symptoms for his assay. One great advantage of using this method is that there is no difficulty in getting a large number of patients to co-operate and to keep records of the number of their hot flushes and other symptoms. In the evaluation of the therapeutic response, the disappearance of hot flushes was used as the most important criterion of relief.

Diethylstilbæstrol was used in doses of 0.5 mg. and 1.0 mg.; hexoestrol in doses of 1.0 mg., 2.5 mg., and 5 mg. daily; 118 B in doses of 1 mg., 2 mg., and 5 mg. daily. Usually the larger dose was given to commence with and the results on the patients' symptoms noted, then after 3 weeks the dose was reduced and the results noted, and then the smallest dose was tried, and finally a different oestrogen was substituted and tried out in various doses. No less than 82 women were given all three preparations and 118 were given diethylstilbæstrol and hexoestrol. His conclusions are: All three of these synthetic oestrogens are highly effective in relieving the distressing symptoms of the menopause if the correct dose is given. A satisfactory daily dose of diethylstilbæstrol is 1 mg.; of hexoestrol, 2.5 to 5 mg.; and of 118 B, 1 to 2 mg. The larger the dose used, the greater the likelihood of untoward reactions such as nausea, dizziness, and

headache, but hexoestrol is definitely less toxic than diethylstilboestrol, and 118 B less toxic than hexoestrol. Greenhill's results differ from some published in this country in 1940, when it was suggested that diethylstilboestrol and hexoestrol were equally potent and that hexoestrol was practically free from toxic reactions.

A. Abarbanel, H. Aranow, and M. J. Goodfriend² prefer to commence the treatment of menopausal patients with a dose of only 0.1 to 0.25 mg. of diethylstilboestrol for the first fortnight and then raise the dose if necessary. They regard the dose level as correct when the patient is not having any flushes at night and only occasional ones during the day. Treatment should be continued for 6 months to reduce the risk of occurrence. If 0.5 mg. or more is necessary each day, they suggest adding 10 mg. of methyl testosterone daily to reduce the chances of uterine hæmorrhage. It should be noted that many authorities would not agree with a menopausal patient being given testosterone for more than a few weeks. As regards toxic symptoms, they found that nausea depended on the dose; if the dose was only 0.1 mg. daily only 1.3 per cent had nausea; with a dose of 0.5 mg. the percentage was 5.3; and when the dose was 5.0 mg. the percentage went up to 41.

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OSTEOMYELITIS, ACUTE, IN CHILDREN.

Sir John Fraser, M.Ch., F.R.C.S.Ed.

There is an increasing feeling that the treatment of acute osteomyelitis in its early stages should be conducted on general and conservative lines. The value of sulphonamide therapy and the results obtained by penicillin in the treatment of staphylococcal infection are fully accepted facts, and with the provision of a potent high-grade staphylococcal antitoxin, the field of therapeutic remedies has been further extended. The result of these developments is that to-day there are comparatively few surgeons who advocate or practise operative interference in the early stages of acute osteomyelitis, the aim being rather to concentrate on the correction of the toxæmia and the bacteriæmia and to restrict operation to the stage when local suppuration has developed.

The importance of such a method of treatment is insisted upon in an article by Mims. Gage¹ of New Orleans. He attributes the distinctive clinical features of staphylococcal osteomyelitis to a toxæmia rather than to a bacteriæmia; he states that eight different types of staphylococcal toxin have been isolated, showing wide variation in the reaction which they induce. Some are so lethal in their effects that death ensues within twenty-four to thirty-six hours, others exert specific destructive effects upon red blood-corpuscles or leucocytes or fibrous tissue, while yet again another group induces focal necrosis of the area in which the infection originates. It is suggested that it is reasonable to accept a clinical classification based upon what is described as the "pathological physiology", a term which is taken to mean the systemic evidences arising from the focal infection. Pursuing this argument, he recognizes six types of the disease, ranging from the profound systemic effect apt to be accompanied by early fatal result to the chronic form where the general reaction is nil and the local changes slight in degree. He proceeds to correlate the general picture with local pathology, the idea being that a diffuse cellulitis of the entire bone-shaft is related to the most intense of the systemic disturbances, while the small primary focus, restricted to the centre of the metaphysis, corresponds to the minimum degree of general illness.

The treatment recommended may be summarized as follows: complete immobilization of the affected limb, the daily administration intravenously of 60,000 to 100,000 units of anti-staphylococcal serum until the toxæmia subsides,

the intravenous or oral administration of sulphathiazole, the maintenance of water balance, blood volume, and electrolytes by injection of glucose in Ringer's solution, of plasma, and of whole blood, and the administration of large amounts of vitamins B and C given intravenously during the toxic stage and later by mouth. It is claimed that treatment instituted on these lines reduces the mortality of the disease to a negligible figure.

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OTTIC MENINGITIS.

F. W. Watkyn-Thomas, F.R.C.S.

Ten years ago the present writer¹ said of the methods of treatment then available: "All these methods have occasionally been successful, and all usually fail. Probably on the whole the best results have been obtained in cases of labyrinthine origin, treated by labyrinthectomy and translabyrinthine drainage, but even in these cases . . . failures far outnumber successes." In the same year J. B. Neal, H. W. Jackson, and E. Appelbaum² reported 623 cases following mastoid or sinus suppuration, with 16 recoveries. H. Neumann³ reported 59 cases with 22 recoveries, but only one recovery in a patient over 15 years of age. Four years later Appelbaum,⁴ using sulphanilamide, reported 21 recoveries in 26 cases of streptococcal meningitis, but only 5 recoveries in 32 cases of pneumococcal infection. Since then the discovery of sulphapyridine has brought the pneumococcal cases into line with the other results.

Without doubt the most important factor in this remarkable improvement has been the use of the *sulphonamide drugs*. All earlier attempts at chemotherapy failed, because the agents used could not pass the barrier of the choroid plexus. All attempts to overcome this difficulty by intra-carotid injection and other methods were unsuccessful. Serum therapy failed for the same reason: antibodies, whether given intravenously or intrathecally, could not reach the infected meninges. Although appropriate sera could raise the general resistance of the patient, they could not raise the resistance at the point of attack. Hexamine, it is true, could pass the barrier, but it has been proved, only too clearly, that it did no good when it had passed.

But chemotherapy is not the only factor; it is most important that we should always remember this, otherwise we may put too much reliance on a single method of treatment, and neglect procedures nearly as essential to success.

Diagnosis.—In his first paper Appelbaum would not accept a diagnosis of meningitis unless organisms were found in the cerebrospinal fluid. We now know that this means dangerous delay. Otitic meningitis is the reaction of the pia-arachnoid membranes to advancing sepsis from the middle ear and its adnexa; "meningismus", "serous", "encysted", or "diffuse suppurative meningitis" are all stages in a single continuous process, as modified by the interplay of invasion and resistance. This is well shown in the cerebrospinal fluid: increasing cells and protein, falling chlorides, and lastly organisms. The earlier treatment is started the better the prognosis. The first signs are headache and pyrexia. Headache in aural suppuration is always a suspicious feature, and when associated with pyrexia demands a lumbar puncture; this is quite safe if we withdraw only 3 or 4 c.c. If there is any rise of cells the case is meningitis. Changes in the discs are frequent and early. Rigidity is valuable as a sign, but variable; the time of onset depends on the distribution of the fluid mass. Changes in reflexes are late. Nystagmus without labyrinth involvement is often seen, but is too uncertain to be reliable.

Treatment.—Once we realize the essential nature of meningitis it follows that the treatment must be the treatment of an advancing suppuration—(1) elimination of focus, (2) provision of drainage, and (3) appropriate medication by drugs or sera.

1. *Elimination of the Focus.*—Over-zealous protagonists of chemotherapy sometimes underrate the importance of this step. In a small group of cases meningitis is associated with acute otitis media but is not due to it; both are manifestations of a fulminating blood infection, and the ear and meninges are invaded almost simultaneously. In such a case there is no focus to eliminate; if later a mastoiditis develops it should be regarded as a fixation-abscess, and treated as such.

In all other cases we must remember that the meningeal invasion is secondary to a suppuration in bone. We know that the sulphonamides have little effect on organisms in formed pus, and less still when the pus is deep in a bony cavity. Under such circumstances the organisms can survive the maximum possible dosage of sulphonamide, and we may be faced by a recurrence of the infection in a patient whose tolerance to sulphonamides has been exhausted.

The usual focus of meningeal infection in aural suppuration is:—

a. Extension into the body of the petrous bone. W. P. Eagleton⁵ showed how the veins passing into the dura on the surface of the petrous are “vulnerable points”, as the walls at the site of entry are no more than tubes of endothelium. He suggested an operation for “unlocking the petrous”, which is still the best method of approach. Advances in the surgery of the petrous⁶ have helped considerably, although many of the operations suggested have been devised for drainage of an apical abscess, which is a far less common condition than infection of the body of the bone.

b. Extension of a labyrinthine suppuration either (i) through the bone, when the petrous route is the best method of attack, (ii) by the aqueduct of the cochlea or vestibule (which is rare), or, by far the most usual, (iii) through the internal auditory meatus. Here the proper method is to open and drain the labyrinth. In such cases the next question is, whether or not to open the internal auditory meatus through the fundus of the vestibule and so drain the septic accumulation in the cisterna pontis. Until the advent of sulphonamides this “translabyrinthine drainage” was the ideal treatment for meningitis of labyrinthine origin—although, of course, it was inappropriate for meningitis with any other origin. Now, when it is essential to maintain a high sulphonamide content in the cerebrospinal fluid, it is probably justifiable to omit this in many cases.

c. A leaking brain abscess, or lateral sinus thrombosis. In these cases the treatment is the treatment of the abscess or the thrombosis. It is rare now for a lateral sinus thrombosis to go untreated for long enough to cause meningitis.

2. *Drainage of the Spaces.*—Apart from translabyrinthine drainage, which, as we have seen, has a very limited applicability, surgical methods of drainage have been futile. The problem of drainage is physiological. In normal life the cerebrospinal fluid percolates the whole brain by way of the perivascular sheaths and is absorbed into the blood-stream by the chorionic villi. In meningitis the perivascular sheath and the villus are clogged by the exudate of cells and protein. The best chance of re-establishing the circulation of the fluid is by causing a vigorous secretion to dilute it. This can be done by intravenous administration of hypotonic saline, the “forced drainage” of L. S. Kubie,⁷ and drawing off the surplus by lumbar puncture.

3. *Medication.*—Chemotherapy by sulphonamides is the only effective means of medication. Of the sulphonamides, sulphapyridine is probably the most useful in meningitis. It has a wider range of activity than sulphanilamide, and passes the choroid plexus more easily than does sulphathiazole. Dosage must be maximal, and the treatment should be controlled by regular estimation of the sulphonamide content of the blood and cerebrospinal fluid, as well as by cell-counts of both and a watch on the urine. Timid, protracted, and unregulated

administration of sulphonamides does no harm to the organism and no good to the patient.

We may fairly sum up the present situation in otitic meningitis by saying that, admitted that sulphonamide treatment is the best weapon in our hands, we can only use it to the fullest advantage by establishing the earliest possible diagnosis and by eliminating, as completely as possible, the causal focus of infection.

REFERENCES.—¹*Med. Annu.* 1934, 208; ²*Year Book of Throat, Nose and Ear*, 1934, 385; ³*Rev. Laryng.*, Paris, 1934, 55, 1; ⁴*Laryngoscope*, 1938, 48, 482; ⁵*J. Laryng.* 1929, 44, 657, 721; ⁶*Med. Annu.* 1932, 150, 1935, 117, and 1936, 138; ⁷*Ibid.* 1936, 170.

PANCREAS, SURGICAL DISEASES OF. *A. Rendle Short, M.D., F.R.C.S.*

Acute Pancreatitis.—R. Starr Lampson,¹ of Hartford, is amongst the many who have come to the conclusion that conservative treatment gives better results than surgery. In an experience of 29 cases, of those operated on at once, 33 per cent died; of those treated medically, only 5 per cent died. In the diagnosis, reliance was placed on Fogel's diastase estimation in the urine; a finding above 300 units indicates pancreatic irritation. The urine must be fresh. He considers that the test is very reliable evidence. Some of the patients treated conservatively subsequently came to the theatre for removal or drainage of the gall-bladder; these all recovered. Allen O. Whipple,² of New York, comes to a similar conclusion; in his hospital the substitution of medical treatment, with or without delayed operation, for immediate surgery has reduced the mortality from 35 to 15 per cent.

Pancreatic Cysts and Pseudo-cysts.—The pseudo-cysts often follow trauma or acute pancreatitis, are unilocular, not lined by epithelium, and develop rapidly. They will usually heal after marsupialization or drainage, in Whipple's experience. Cysts can seldom be removed. If they are multilocular or cystadenomatous, involving the greater part of the pancreas, it is better to let them alone, or a distressing pancreatic fistula may follow. If drainage or marsupialization is the method adopted, continuous suction may be employed to protect the skin. Whipple injects, a few days later, some sclerosing fluid such as is used for varicose veins; this rapidly diminishes the flow, and in a few weeks it will probably cease altogether. If it does not, it may be possible to transplant the fistula into the stomach or jejunum.

Tumours of the Pancreas.—At Whipple's hospital, 22 patients have been operated on for islet-cell tumours producing hypoglycæmia: 2 died; 16 were cured. The syndrome associated with islet-cell tumours must present the essential triad of attacks: central-nervous system disorder—motor, vasomotor, or psychic—coming on during the fasting state; fasting blood-sugar levels of 50 mg. per 100 c.c. or less; and immediate recovery from these attacks when sugar is given, either intravenously or by mouth. In the majority of epileptic and narcoleptic patients with disturbed blood-sugar levels the characteristic triad is not found, and the electro-encephalogram may show that the case is one of epilepsy. If no tumour is found, removal of two-thirds of the pancreas (35 to 60 g.) will cure about 60 per cent of the patients. Small islet-cell tumours may give rise to more severe symptoms than the larger ones.

Malignant Tumours.—Whipple gives a history of surgeons' attempts to remove carcinomata of the head of the pancreas or ampulla of Vater. Now that the hæmorrhagic tendency in jaundiced patients can be dealt with by giving vitamin K; liver damage repaired by high protein and high carbohydrate diet and vitamin B; and shock controlled by spinal anaesthesia and blood, plasma, or serum transfusions, the severe operation of duodeno-pancreatectomy can be carried out in one stage. A gastro-jejunostomy is performed, and the bile-duct implanted in the jejunum, the pancreatic duct is ligated with silk, and the cut

end of the pancreas carefully sutured. He has had a successful case. If only these patients could and would be referred to the surgeon before they are "studied to death," while the cancer is small and localized and before the patients are seriously ill with weeks of obstructive jaundice, a far lower operative mortality and much longer survival would result.

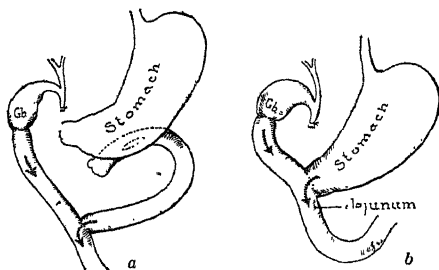


Fig. 24.—Diagrams in which the anastomosis done in the two-stage operation of Whipple (a) is compared with the simplified anastomosis of Pearse (b). Note that the physiological principles of both are the same. (Reproduced from "Surgery, Gynecology and Obstetrics".)

Another procedure for a one-stage excision of the duodenum and head of the pancreas, for malignant disease, is described by H. E. Pearse,³ of New York, and a successful case is reported. The difference between his operation and Whipple's is shown in the two diagrams in Fig. 24. The common bile-duct and the pancreatic duct were ligated. The whole duodenum was removed. The operation took seven hours.

REFERENCES.—¹*Ann. Surg.* 1942, **116**, 367; ²*New Engl. J. Med.* 1942, **226**, 515; ³*Surg. Gynec. Obstet.* 1942, **75**, 333.

PANCREAS, TUMOUR OF. *Sir Walter Langdon-Brown, M.D., D.Sc., F.R.C.P.* *Samuel Leonard Simpson, M.A., M.D., F.R.C.P.*

Spontaneous Hypoglycæmia due to a Tumour of the Islands of Langerhans.—C. V. Beek, A. J. Ch. Haex, and P. J. Kooreman¹ report 2 cases of this condition. The first was a woman of 52, with a carcinoma of the islets of Langerhans (only seven cases have been previously reported) and liver metastases. The patient was obese, and was ill for eight weeks with severe abdominal pain and vomiting, and, in spite of this, dullness and sleepiness verging on coma. The second patient was a male of 18, who for some months was believed to be suffering from atypical epilepsy, characterized by attacks of faintness and dreaminess² or talkativeness followed by sleep, or convulsions followed by coma. The average fasting blood-sugar was 48 mg. per 100 c.c. Two small "adenomata" ($\frac{1}{2}$ to 1 c.c. in diameter) of the pancreas were found and removed. Histology showed that they were not true adenomata. At a second operation a partial pancreatectomy (tail end) was performed. Biopsy showed normal pancreatic tissue, and the hypoglycæmic attacks continued. A third operation revealed an elastic tumour about the size of a small hazel-nut in the head of the pancreas and projecting into the duodenum. This was removed and the patient cured, blood-sugar returning to normal and no further attacks ensuing. The authors report two other cases from the literature, in which an islet tumour in the posterior aspect of the head of the pancreas was missed at the first operation, and emphasize the importance of mobilization of the duodenum and palpation and inspection of the entire head of the pancreas before deciding on a partial pancreatectomy. (See also RADIOLOGY-PANCREATIC TUMOURS.)

REFERENCE.—¹*Acta med. scand.* 1942, **62**, 184.

PARATHYROID GLANDS. *Sir Walter Langdon-Brown, M.D., D.Sc., F.R.C.P.* *Samuel Leonard Simpson, M.A., M.D., F.R.C.P.*

Hyperparathyroidism.—O. Cope¹ reviews no less than 67 cases of hyperparathyroidism seen at the Massachusetts General Hospital during the past ten

years. He emphasizes that bone changes may be absent or slight in mild cases, or even in severe cases, when the calcium intake is slight; 12 per cent of patients with renal calculi as the presenting feature had primary hyperparathyroidism. A persistent low blood-phosphorus is diagnostic, even in the absence of an elevated blood-calcium. In primary hyperparathyroidism, the lesion may be hyperplasia of four parathyroid glands, or an adenoma of one or rarely of two glands. In hyperplasia, $3\frac{1}{2}$ glands should be removed. The parathyroid glands were found all the way from the larynx to the heart. Parathyroid hyperplasia may be secondary to primary renal disease or vitamin D deficiency.

Primary and Secondary Hyperparathyroidism.—L. J. Soffer and C. Cohn² describe 9 cases of hyperparathyroidism, 5 of which were primary, due to adenoma of a parathyroid gland, and 4 secondary to chronic renal disease, multiple myeloma, and carcinomatous metastases to the bones. They are sufficiently instructive from a diagnostic point to justify individual review.

Case 1, a woman of 47, was admitted to hospital for urinary frequency and dysuria, but the diagnosis was missed; two years later bilateral dendritic calculi were seen on radiographs; five years later hæmaturia occurred, then rarefaction of the skeleton was noted. The blood-calcium, however, was only slightly raised, 10.4 to 11.9 mg. per 100 c.c., and the phosphorus was high and not low, 5.6 mg. This may occur when renal function is impaired. Surgery of the neck failed to reveal any abnormal parathyroid glands. A year later the patient suffered a fracture of the femur and died in uræmia. At post-mortem there was found a *retrosternal* parathyroid gland.

Case 2 was a woman of 34 with urinary frequency, kyphosis, rarefaction of bones, loss of weight 30 lb., serum calcium 11.8 to 13.5 mg., serum phosphorus 2.6 to 3.3 mg., high phosphatase 134 units, and negative calcium balance (intake 300 mg., urinary excretion 1050 mg.). At operation no abnormal parathyroid glands were found; but at second operation later on, a large adenoma of a parathyroid gland in the mediastinum was found and removed with resulting benefit.

Case 3, a man of 40, had suffered from recurrent urinary calculi for five years. The blood chemistry was characteristic of hyperthyroidism, and the bones rarefied. At operation four enlarged parathyroid glands were found. Two were removed and one showed a chief cell adenoma. Improvement was temporary, and he was readmitted complaining of weakness, fatigue and pains, and a recurrent tumour of the jaw. The blood chemistry was still abnormal, and characteristic of hyperparathyroidism. At a further operation one and a half of the remaining two glands were removed. The patient developed tetany, which was controlled by dihydrotachysterol, but after this his general and bone condition improved markedly. Thus it appears possible to have a primary hyperparathyroidism comparable to a primary hyperthyroidism, with or without adenoma formation.

The fourth case was a woman of 36 with recurrent bilateral renal calculi, minimal bony changes, and only slight deviation of blood chemistry; but a parathyroid adenoma was found and removed. No report on the subsequent effect on the renal calculi is given.

The fifth case was a woman of 54 with generalized aches and pains of 20 years' duration and recent polyuria and polydipsia. The urine contained albumin and casts, and renal function was poor. But the serum calcium was 13 mg. and the phosphorus 3.6 mg., and the bones showed typical rarefaction. At operation a parathyroid adenoma was found and removed, and the condition was believed to be primary hyperparathyroidism with secondary renal involvement.

In the remaining four cases, hyperparathyroidism was secondary to bone involvement by other diseases. In Case 6, of multiple myelomata, the blood

calcium was raised 14.2 mg. but the phosphatase was normal. In *Case 7*, a woman of 39, with malignant metastases of bone secondary to a breast carcinoma, the blood-calcium was 15.4 mg., the phosphorus 4.5 mg., and the phosphatase raised, 60 units, with a negative calcium balance, but exploration of the neck showed 4 apparently normal parathyroid glands. The eighth case is described as hyperparathyroidism secondary to chronic renal disease, but the clinical description and autopsy findings of "extensive deposition of calcium throughout the soft tissues of the body" suggest the reverse order. The four parathyroids were found to be unusually large and hyperplastic. The blood-pressure was 110 systolic and 50 diastolic. The ninth case, hyperparathyroidism, was also associated with four hyperplastic parathyroid glands, and is perhaps more likely to have been secondary to a chronic nephritis of some years' standing. Blood-pressure was 186 systolic and 110 diastolic; renal function was very poor, blood-calcium 11.5 mg.; phosphorus raised, 7 mg., and phosphatase moderately raised, 20 units. The patient died in uræmia after two parathyroid glands were removed. This case illustrates the difficulty of differentiating primary from secondary hyperparathyroidism, but from a practical point of view, when renal function is so severely impaired, and blood phosphorus so raised, surgery is unlikely to be of use.

Hyperparathyroidism and Albright's Syndrome.—L. W. Gorham³ reviews 51 collected reports of Albright's syndrome of osteitis fibrosa cystica, brown pigmented spots, and precocious puberty, 20 of which were mistaken for hyperparathyroidism and uselessly operated upon. The syndrome has no known connection with hyperparathyroidism, which it superficially resembles because of areas of rarefaction in bones. These areas, however, are scattered, localized and multiple, while the associated cutaneous pigmentation has a nerve segmental distribution. Sexual and somatic precocity occur in girls, but sexual precocity is rare in boys. The disease usually starts before the age of 10. The blood-calcium and phosphorus and the calcium excretion are usually normal.

REFERENCES.—¹*J. Amer. med. Ass.* 1942, **120**, 863; ²*Arch. intern. Med.* 1943, **71**, 630; ³*J. Amer. med. Ass.* 1943, **122**, 469.

PARATYPHOID FEVER. (See ENTERIC FEVER.)

PERIRECTAL SUPPURATION.

W. B. Gabriel, M.S., F.R.C.S.

Discussing the problem of perirectal suppuration, T. McW. Millar¹ refers briefly to the subcutaneous or perianal abscess, the submucous abscess, and the ischiorectal abscess. He then makes a distinction between the *pelvi-rectal* and *para-rectal* abscesses. In the former the pelvi-rectal space is not usually infected from the rectum but from outside sources such as the prostate, base of the bladder, and seminal vesicles in the male, and from the parametrium and broad ligament in the female. This abscess eventually perforates the levator ani and infects the ischiorectal fossa; it never perforates into the rectum. The para-rectal abscess, on the other hand, forms within the fascia propria of the rectum, which prevents it from infecting the pelvi-rectal space, and it always ruptures into the rectum. Millar refers also to the frequency of peri-rectal suppuration in other diseases of the colon and rectum—for instance, in ulcerative colitis and in regional ileitis: in connection with this disease the paper of A. Penner and B. B. Crohn² is mentioned. They reported 3 cases of regional ileitis which developed fistulae and advised careful pre-operative study in all cases of fistula in ano, including when necessary, proctoscopy and X-ray examination of the chest and of the intestinal tract.

REFERENCES.—¹*Edinb. med. J.* 1942, **41**, 691; ²*Ann. Surg.* 1938, **108**, 867.

PERITONEUM, SURGERY OF.*A. Rendle Short, M.D., F.R.C.S.*

Many surgeons are making trial of the use of *sulphonamides* introduced into the peritoneal cavity, either in powder form or in solution. Much animal experimentation has been done to test their value, for instance by Le Roy Walter and W. R. Cole,¹ of Chicago; by R. R. Crutcher and R. A. Daniel,² of Nashville; and by R. K. Gilchrist and colleagues,³ of Chicago. Gilchrist recommends the intravenous injection of sodium sulphathiazole, followed by dusting of the peritoneal cavity with the same drug. This soon produces a high concentration, with a high bactericidal efficiency. Crutcher and Daniel warn that all the sulphonamides placed in the abdominal cavity may produce very persistent adhesions. Masses of the drug become walled off as a foreign body which is absorbed very slowly. Walter and Cole used sulphadiazine in 68 cases in the human subject, and sulphanilamide in 62 other patients. Sulphadiazine was more effectual in preventing wound infection; and no toxicity was observed. They recommend sprinkling 4 g. inside the peritoneum and 2 g. in the abdominal incision. [One hears verbally that more recent American experience is less favourable. There may be a considerable outpouring of transudate fluid.—A. R. S.]

REFERENCES.—¹*Surg. Gynec. Obstet.* 1943, **76**, 524; ²*Ann. Surg.* 1943, **117**, 677; ³*Surg. Gynec. Obstet.* 1943, **76**, 689.

PITUITARY GLAND.*Sir Walter Langdon-Brown, M.D., D.Sc., F.R.C.P.**Samuel Leonard Simpson, M.A., M.D., F.R.C.P.*

Sudden Senescence.—R. Greene and A. S. Paterson¹ describe an interesting case of sudden senescence resembling Simmonds's cachexia. A man of 40, in good health, fell from a stationary engine, and, although there was no obvious physical injury or definite concussion, he suffered severe shock, and immediately developed weakness, emotionalism, headache, and photophobia. He felt himself to be a feeble old man, lost all libido and potency, and commencing with alopecia areata, developed complete alopecia of the scalp in a few months, shaved once a week, and lost some hair from body, pubis, and axillæ. His pulse-rate was 72, and blood-pressure 148/90 mm. Hg. Some improvement occurred with hospitalization. In 1938, A. P. Thomson² reported a similar case with a considerable degree of recovery. The authors point to some resemblance to Simmonds's cachexia (in which, however, alopecia is rare or absent), and a syndrome described by Snapper and others of hypogonadism, hypothyroidism, and alopecia. They postulate a hypothalamic mechanism.

Diabetes Insipidus and Pregnancy.—H. Blotner and P. Kunkel³ describe 2 instances of diabetes insipidus associated with pregnancy and note its rarity, namely, 3 cases in 50,000 deliveries at the Boston Hospital. The condition may be aggravated, ameliorated, or uninfluenced by pregnancy; or it may commence during pregnancy and be transitory or permanent. When diabetes insipidus appears during pregnancy it often disappears after parturition. In one recorded case the onset was after parturition and the duration six weeks. These variations are, in all probability, due to changes in the pituitary gland during pregnancy and the puerperium. The foetal posterior pituitary gland may play a part.

Slowly Acting Pituitary Preparations in the Treatment of Diabetes Insipidus.—D. Court and S. Taylor⁴ tried the effect of (a) pituitary emulsions, and (b) pitressin tannate in oil. The former method was found impracticable, owing to the delayed formation of paraffinomata at the site of injection, but the latter method proved safe and effective as has been previously observed. Pitressin was precipitated by tannic acid, and the insoluble 'tannate' suspended in sterile peanut oil so that 1 c.c. contained 5 pressor units. The suspension must be thoroughly shaken before use, and injected intramuscularly. In spite of the

former precaution, the duration of effect varied between 30 and 120 hours. The average dose was 0.4 c.c. every 48 hours. No rise of blood-pressure or intestinal symptoms followed the injections. Excessive water retention may occur if the dosage is too large. [This method can be recommended as a therapeutic advance in the treatment of a troublesome condition.—W. L.-B.]

REFERENCES.—¹*Lancet*, 1943, 2, 158; ²*Ibid.* 1938, 2, 135; ³*New Engl. J. Med.* 1942, 227, 287; ⁴*Lancet*, 1943, 1, 265.

PLEURITIS, OBLITERATIVE.

Maurice Davidson, M.D., F.R.C.P.

The production of an aseptic obliterative pleuritis as a preliminary to many of the major procedures of thoracic surgery has been recognized for some time. R. C. Brock¹ gives the results of his experience in 42 cases in which the introduction of small amounts of silver nitrate solution into the pleural cavity has been employed as a substitute for the better known method of 'poudrage'. The technique of the silver nitrate method is considerably simpler, and appears to cause rather less disturbance to the patients. The average quantity injected is 7.5 min. of a 10 per cent solution, an all-glass syringe being used in preference to a metal one on account of the precipitation of metallic silver upon the latter. Brock has used this method not only as a preliminary to lobectomy or to Monaldi's drainage operation, but also to cure the condition of chronic or recurrent spontaneous pneumothorax and to relieve the condition of chronic recurrent pleural effusion. The disadvantages of pain and general reaction appear to be inevitable, but they do not constitute an insuperable difficulty. The most striking results were obtained in the 20 instances in which the method was used in the treatment of spontaneous pneumothorax, many of the cases being previously most resistant and intractable. In the majority of instances a single injection is sufficient, but occasionally a second is necessary.

REFERENCE.—¹*Guy's Hosp. Rep.* 1942, 91, 99.

PNEUMONECTOMY. (See also TUBERCULOSIS, PULMONARY, SURGICAL ASPECT.)

A. Tudor Edwards, M.Ch., F.R.C.S.

Effect of Pneumonectomy upon Cardio-pulmonary Function in Adults.—Many observations of the cardio-respiratory effects after pneumonectomy, firstly on experimental animals and secondly on patients, have been carried out. The former can be responsible for many errors, and do not take into consideration the fact that in many adults the condition of the remaining lung may not be normal. These studies are also of value as deciding the optimum position of the mediastinum—in other words, whether its replacement into the middle line by a late thoracoplasty may not be an advantage in certain cases.

For the purpose of this work (A. Courmand and F. B. Berry¹), patients were divided into two groups—Group I consisting of 6 patients aged from 32 to 47 years, and Group II consisting of 4 patients with ages ranging from 53 to 66 years. As regards ventilatory function, the findings were: (a) the lung was somewhat distended, more so in the older group; (b) the maximal efficiency of the chest bellows in displacing air with only one lung was better than predicted in the younger subjects but as predicted in the older age-group; and (c) relative hyperventilation was present during exercise and persisted during the recovery period in the older subjects, further encroached upon the breathing reserve, and caused a tendency to dyspnoea. In considering the gas exchange, the only abnormality noted among both groups was a lower efficiency in supplying oxygen to the tissues in the older patients during exertion and immediately after. Aeration of blood leaving the lung was well within normal range. Routine measurements of cardio-circulatory function, including blood-pressure, electrocardiogram, and ballistocardiogram, fails to reveal any abnormality connected with surgical

removal of the lung. In some patients in whom there was evidence of over-distension of the remaining lung thoracoplasty was decided upon with beneficial results.

Effect of Pneumonectomy on the Cardio-pulmonary Function in Children.—C. W. Lester, A. Cournand, and R. L. Riley² have studied the findings in 3 patients operated upon in childhood. The first case was done in two stages, the left lower lobe being removed when the child was five years old and the upper lobe at six years of age. The second was a boy of twelve years, the whole left lung being removed for bronchiectasis at ten years of age. The third child had a left pneumonectomy at ten years of age and investigation was carried out four years later.

The results of the tests for lung volume showed that in two cases the remaining lung volume was the same size as in the control group. In one case the remaining lung was the size of both lungs in the control group. Maximum breathing capacities showed two patients to have 76 and 78 per cent of the capacity of the controls, while the other had only 62 per cent, the latter being the case with increased lung volume. The breathing reserves were less for the patients than for normal children—all had smaller volumes of oxygen intake than their controls, but the percentage of oxyhæmoglobin was within normal limits. Following moderate exercise the rates of ventilation were within normal limits, breathing reserves were less, rates of oxygen intake were normal. Total oxygen intake and total carbon dioxide output were greater. After severe exercise the efficiency of gas exchange was found to be excellent in all tests.

It was noted that two of the children studied showed better adaptation to the physiological and anatomical changes following pneumonectomy than the other child. The latter had an over-distended right lung owing to non-fixation of the mediastinum. It is almost certain that emphysematous changes had occurred in this case.

The technique of carrying out the tests and detailed description of the results are presented in the paper, and on the whole afford definite evidence of the ability of the compensatory mechanics of the respiratory and cardiovascular systems to function adequately following pneumonectomy.

Closure of Bronchus following Pneumonectomy.—Reopening of the bronchial stump is the commonest of the serious complications of pneumonectomy, as many of such cases end fatally.

As a result of experimental work on more than 250 dogs submitted to the operation, W. F. Rienhoff et al.³ have approached the problem from two angles: (1) to develop a method of closure of the primary bronchus of the dog that could be used successfully in a high percentage of cases either for the left or right side; and (2) that the method should be applicable to the closure of the primary bronchus in the human. Likewise specimens from humans removed at autopsy at intervals of a few days to three years were examined.

From these experiments and specimens it appeared that the main point of healing of the bronchus is the cut end. Thus every effort must be made to preserve the viability of this portion not only by gentle handling which avoids any form of trauma, such as crushing, cauterization, or suturing, but also by preserving the circulation in the bronchial artery. Mattress sutures, which should be inserted parallel with the line of the bronchus, should be placed as far up the bronchus as possible, and should not be more in number than will fully occlude the bronchus, so as not to interfere with the blood-supply, as if the circulation is cut off the entire end of the cuff distal to the suture line will slough. Primary agglutination of this open end is thus prevented, so that when any of the occluding sutures give way a bronchial fistula develops at once. After division of the bronchus and following the placing of the sutures it is well to

allow the bronchial artery to bleed while they are being tied in order to avoid occluding this vessel in one of the stitches.

The bronchial stump should be brought into apposition with nearby or contiguous viable tissue, preferably mediastinal pleura. The mediastinum should not be closed tightly about the stump, but an avenue provided for the escape of air in case the bronchus opens.

Non-absorbable sutures are advocated for the occlusion sutures, as they allow sufficient length of time to permit healing of the cut ends. The granulation tissue and its later organization as fibrous tissue, which brings about closure of the cuff-like open end of the bronchial stump, is derived mainly from the bronchial walls.

REFERENCES.—¹*Ann. Surg.* 1942, **116**, 532; ²*J. thorac. Surg.* 1942, **11**, 520; ³*Ann. Surg.* 1924, **116**, 481.

PNEUMONIAS, THE. (See also RADIOLOGY : DIAGNOSIS.)

Maurice Davidson, M.D., F.R.C.P.

Literature dealing with the various forms of pneumonia and their aetiology continues to accumulate, and numerous terms have appeared which, though designed by their authors to simplify, have by their multiplicity tended unfortunately to complicate our conceptions of the subject and to confuse the mind of the practitioner. The subject of *atypical pneumonia* was discussed at a meeting of the Medical Section of the Royal Society of Medicine at which J. W. Brown¹ endeavoured in his opening address to simplify the classification of primary pneumonias. He indicates three main groups: (1) Typical lobar pneumonia, usually due to pneumococci, and exhibiting a characteristic clinical picture and clinical course; (2) Bronchopneumonia, due to various infective organisms, and exhibiting a patchy distribution of lung lesions, the clinical course of the disease being irregular and less definite than in the lobar variety; (3) Pneumonias for which no bacterial causative agent can be found. The last-named group includes such conditions as psittacosis, influenza, Q fever, and others for which no aetiological factors can be determined and which form the majority of atypical pneumonias. Brown points out that in 143 cases of pneumonia occurring in a U.S. Army hospital in this country over a period of 8 months, 102 (i.e., 71·3 per cent) were atypical. The incidence of pneumonias of this group has been considerable in the U.S.A., where the matter has aroused no little comment, largely owing to the numerous epidemics that have been reported. The matter was studied in 1941 by a Commission appointed to investigate an outbreak which occurred in an Army establishment in U.S.A. Out of a total of 1188 cases of respiratory disease scheduled, 228 records of atypical pneumonia were found; and of the 224 patients examined, 69 (i.e., 30·8 per cent) came under this heading. American literature abounds with reports of these cases; among the most recent authors may be mentioned H. A. Iverson,² R. P. Becker,³ J. F. Meakins,⁴ J. H. Dingle et al.,⁵ and L. B. Duggan and W. L. Powers.⁶

The presence of a virus as a causative factor has been postulated by many, Duggan and Powers (loc. cit.) in their review of 40 cases incline to this view, chiefly because of the evident contagiousness of the disease, its failure to give reactions associated with known pathogenic organisms or to respond to treatment with drugs of the sulphonamide group, and the experimental production of a virus in animals. Their clinical observations are similar to those of H. A. Reimann and W. P. Havens,⁷ whose article on epidemic respiratory infections was reviewed in the *MEDICAL ANNUAL* of 1941.

A commentary on *staphylococcal lung infection* is furnished by M. Finland, O. L. Peterson, and E. Strauss⁸ based on a study of 66 cases of influenza

complicated by infection of the respiratory tract in which the *Staphylococcus aureus* was found as the only or as the predominant organism. Of all these, 13 cases were fatal, 11 had severe pneumonia, 18 had acute pneumonia with rapid recovery; among the remainder were cases of tracheo-bronchitis. Treatment with sulphadiazine or sulphathiazole in full doses is recommended by them for such cases, and they suggest, moreover, a brief course of treatment with these drugs in severe uncomplicated influenza in all patients who are carriers of large numbers of pathogenic staphylococci or hæmolytic streptococci or when these organisms are known to be prevalent in a community.

REFERENCES.—¹*Proc. R. Soc. med.* 1943, **36**, 385; ²*Johns Hopkins Hosp. Bull.* 1943, **72**, 89; ³*Canad. med. Ass. J.* 1943, **48**, 324; ⁴*Ibid.* 333; ⁵*War Med.* 1943, **3**, 223; ⁶*J. Lab. clin. med.* 1943, **28**, 524; ⁷*Arch. intern. Med.* 1940, **65**, 138; ⁸*Ibid.* 1942, **70**, 183.

PNEUMONOCONIOSIS.

Maurice Davidson, M.D., F.R.C.P.

Boiler-scaler's Lung.—A further contribution to the literature of occupational disease of the lungs comes from Lasar Dunner,¹ who refers to the scanty recognition of lung disease in boiler scalers, who are exposed to the dust not only of the flue which they have to clean but also of the scale precipitated on the walls of the boiler. He refers to the only two papers he has found in the literature, one by W. E. Cooke² reporting one fatal case complicated by tuberculosis, the other by H. G. Williams³ reporting 6 cases, one of which, complicated by tuberculosis, was fatal. The author himself has notes of 12 cases on which he gives a short report. As in other forms of pneumoconiosis, the clinical features are not diagnostic, being like those of chronic bronchitis and emphysema, though in addition to dyspnoea he notes the occurrence in some cases of severe pain in the chest which induced the scalers to give up their work. The radiographs reproduced show appearances similar to those familiar to students of well-recognized forms of silicosis, two forms—(a) the mottling or nodular type, and (b) the diffuse fibrotic type—being seen. The author emphasizes the necessity of X-ray examination of any boiler scalers who complain of chest symptoms, however slight, and claims an extension to these men of the same statutory rights as are accorded to other workers suffering from pulmonary dust diseases.

Coal-miners' Pneumoconiosis.—E. A. Aslett, T. W. Davies, and T. I. Jenkins,⁴ by re-examination radiologically of 27 anthracite miners who had been X-rayed 3½ years previously, have endeavoured to trace the development of the various radiographic appearances and their progression from one stage to another. They have reproduced some fine illustrations showing the progression from nodulation to coalescent nodulation, from coalescent nodulation to massive shadow, from multiple fluffy shadows to massive shadow, and so forth. Their results are classified and clearly described, and are of no little importance in elucidating the changes in the radiological phenomena over a period of time. The value of tomography in this disease is illustrated. This is a short paper, but most lucid; it is of the greatest value to those who look for a succinct and reliable summary of this aspect of pneumoconiosis.

REFERENCES.—¹*Brit. J. Radiol.* 1943, **16**, 287; ²*Brit. med. J.* 1930, **2**, 816; ³*Nineteenth Annual Report of the King Edward VII National Memorial Association for the year ending March 31, 1931*; ⁴*Brit. J. Radiol.* 1943, **16**, 308

POLIOMYELITIS: SEWAGE AS A VEHICLE OF THE VIRUS.

Ralph M. F. Picken, M.B., Ch.B., B.Sc., D.P.H.

In a very full review of recent work on the transmission of poliomyelitis, C. Kling, G. Olin, J. Fähræus, and G. Norlin¹ give an account of their own examinations of sewage in Stockholm during and after a minor epidemic of the disease in the summer and autumn of 1939. At the height of the epidemic they collected a sample of sewage from an area where only a few cases were known

at that time, and which did not contain an isolation hospital. Although stored at 4° C. for two months before it was inoculated into a macacus monkey, typical paralytic poliomyelitis was produced. A sample taken three months after the last human case had been reported produced the disease in a monkey in a modified non-paralytic form. A further test, nine months after the cessation of the epidemic, was negative. Sewage must therefore be regarded as an important vehicle, and, taken in conjunction with the well-authenticated presence of the virus in stools both of carriers and cases and its occasional discovery in drinking water, these observations strengthen the case for regarding poliomyelitis as belonging to the group of alimentary infections. Prophylaxis should proceed on this hypothesis. The authors adduce reasons for believing that the virus not only lives but multiplies outside the human body, and they believe that this implies a living non-human vector. They have been studying the protozoal fauna of stools, waters, and sewage, and provisionally suspect a species of the genus *Bodo*, possibly *Bodo candatus*. They are pursuing investigations on these lines.

In this connection interest attaches to an examination of the effect of activated sludge on poliomyelitis virus by H. J. Carlson, G. M. Ridenour, and C. F. McKhann.² Mouse-adapted virus, ground in silica and suspended in buffered broth, then diluted to 1 in 300 with activated sludge, was treated in sludge concentrations of 1100, 2200, and 3300 parts per million for aeration-periods of six and nine hours. Controls were provided by exposure of the suspension to sludge without aeration and to aeration without sludge. Activated sludge at 1100 parts per million with six hours' aeration removed or inactivated the virus sufficiently to reduce the infectivity to mice to a great extent, and heavier concentrations and longer aeration periods largely eliminated infectivity. It will be noted that the practical value of these results would be weakened if the theory of Kling et al. (above) as to a protozoal vector in naturally infected sewage were confirmed. The same workers had previously³ found that ordinary processes for purifying water, including chlorination, failed to destroy or remove completely the virus of poliomyelitis. K. F. Maxey,⁴ however, points out that the epidemiological behaviour of poliomyelitis is inconsistent with the theory that it is ordinarily spread by water.

REFERENCES.—¹*Acta med. scand.* 1942, **112**, 217; ²*Amer. J. publ. Hlth.* 1943, **33**, 1083; ³*Ibid.* 1942, **32**, 1256; ⁴*Ibid.* 1943, **33**, 41.

POST-OPERATIVE ATELECTASIS. (See LUNG, COLLAPSE OF.)

PREGNANCY WITH ESSENTIAL HYPERTENSION AND PREGNANCY TOXÆMIA.

Clifford White, M.D., F.R.C.P., F.R.C.S., F.R.C.O.G.

The frequency with which hypertension co-exists with pregnancy has received increasing attention during the last few years. Not very long ago the two conditions which were regarded as important were pregnancy complicated by toxæmia and pregnancy complicated by 'nephritis'. Long-standing toxæmic albuminuria was thought occasionally to lead to chronic glomerular nephritis. The newer view is that the two common conditions are (1) a pregnancy toxæmia occurring in a healthy woman and leading to pre-eclampsia and eclampsia, and (2) pregnancy occurring in a patient with essential hypertension. The hypertension—probably unrecognized before the pregnancy—may lead to obvious albuminuria and œdema during the last half of pregnancy with persistence of the hypertension and albuminuria after the puerperium; this view will explain a number of cases which it was difficult to fit into the old classification. Briefly, toxæmia may be said to be a disease chiefly affecting young primigravidæ, occurring towards the end of a pregnancy, sometimes ending in eclampsia, improving

rapidly after delivery, not associated with retinal changes, and a fair number of the children being born alive; whereas the hypertensive patients are often multiparæ who have a raised blood-pressure from before the beginning of pregnancy or develop it soon after the pregnancy commences, they develop œdema and albuminuria at about the 28th week, are delivered of a dead child, and are found to be hypertensive and probably albuminuric after their puerperium.

A. J. B. Tillman¹ gives three possible explanations of hypertensive-albuminuric pregnancy: (1) That it is the same disease and has the same aetiology as in the non-pregnant state—against this is the occurrence of eclampsia, which never occurs with hypertension without pregnancy; (2) That it is a disease primarily due to the pregnancy; and (3) That it represents the disease as it occurs in the non-pregnant plus additional disease directly due to the pregnancy. The last seems the most probable, i.e., that hypertension predisposes to the occurrence of toxæmia during pregnancy. If a nullipara who already has hypertension becomes pregnant, the hypertension is generally aggravated, occasionally remains apparently unaffected, and is very rarely decreased in severity. F. J. Browne and G. H. Dodds² found that no exacerbation in any form occurred in 17 per cent of a series of 239 pregnancies. If the hypertension is sufficiently severe to be accompanied by œdema and albuminuria before pregnancy it is practically certain to increase during the pregnancy. If not present prior to the pregnancy, œdema and albuminuria tend to appear during the last 3 months of the pregnancy unless great care is taken. Occasional exceptions occur, and Tillman gives examples of cases where hypertension (over 160 mm.) was known to exist before pregnancy but where the blood-pressure fell gradually during the first 8 months of the pregnancy only to rise suddenly to 180 mm. in the 9th month. It must be stressed that if a patient is only examined and tested during the last 3 months of her pregnancy, it is impossible to say at once whether the case is one of toxæmia arising in a healthy patient or one of toxæmia added to hypertension; but it is obvious that the ultimate prognosis is different in the two cases. Hence the importance of having a blood-pressure record prior to the beginning of pregnancy.

N. J. Eastman and J. Whitridge³ note that the incidence of eclampsia in Johns Hopkins Hospital during the last decade is about one-fourth of that observed during the first two decades of the century, also that the mortality has fallen from about 20 per cent in the early years of the century to 5 per cent during the last ten years. On the other hand with increased care in the ante-natal department, a larger number of patients with mild toxæmia are admitted for treatment and so the incidence of toxæmia has apparently increased. They state that the decrease in the number of cases of eclampsia is found wherever good antenatal treatment is available, but in certain parts of America where antenatal care is not available the incidence of eclampsia has remained much as it was. To obtain results patients must attend a doctor every 4 weeks during the first 5 months, every 2 or 3 weeks during the 6th, 7th, and 8th months, and every week during the last month of the pregnancy. The earliest warning of the onset of toxæmia is given by the blood-pressure and so the importance of regular and frequent blood-pressure readings cannot be emphasized too strongly. They state: "The absolute blood-pressure reading is probably of less significance than the relationship it bears to previous estimations and to the age of the patient. For example, a rise from 110/70 to 135/85 in a young woman is a more urgent danger signal than a rise from 135/85 to 150/90 in a patient of 35. We have seen a number of girls of 15 and 16 with eclampsia whose blood-pressure never exceeded 135 systolic and 90 diastolic, but the normal, basal pressure of these young women was in the neighbourhood of 105/65. Similarly, in China, where the blood-pressure of every

one averages 10 or 15 points lower than in this country [America], eclampsia with readings of 130 systolic and 85 diastolic is not uncommon. The next most constant sign of pre-eclampsia is sudden, excessive gain in weight. Sudden gains of more than 2 pounds (0.9 kilo) a week should be viewed with suspicion and gains of more than 3 pounds (1.4 kilo) with alarm. The sudden appearance of albumin in the urine with or without other findings or symptoms should always be regarded as a sign of impending eclampsia."

The importance of chronic essential hypertension is shown by it having been responsible for 80 per cent of their toxæmia deaths during the last decade. Since the hypertension cannot be prevented it is most important to recognize it early and treat it fully. A brief summary of the treatment recommended by Eastman and Whitridge is: With the blood-pressure over 170, albuminuria, reduced renal function, cardiac symptoms, and retinal hæmorrhages, terminate the pregnancy at once whatever the stage of the gestation. With the pressure 145, no albumin, normal renal function and eye-grounds, keep the patient under observation and let the pregnancy continue. Intermediate cases must be treated on their merits, but the question of sterilization must be considered in all cases.

If signs of pre-eclampsia come on the patient rests in bed and is put on a diet in which salt is avoided both at the table and in the kitchen. They do not object to their patients taking meat provided it is not salted meat. The fluid intake should be 3000 c.c. daily. Sedatives and laxatives may also be necessary. Failure of the patient to respond to treatment involves a risk of eclampsia and also a risk of permanent renal damage if the duration is over 3 weeks, and hence termination of pregnancy is often necessary in pre-eclampsia. If the head is low and the patient near term and the cervix soft, thin, and dilated to 1 or 2 cm. they advise rupture of the membranes; in the opposite type of case, Cæsarean section is useful. If eclampsia comes on, Cæsarean section and other operative methods of delivery are contra-indicated and better results are obtained by 30 c.c. of paraldehyde per rectum followed by doses of 15 c.c. as may be necessary to control the fits. "Sedatives, darkness, and quiet constitute our best allies in the treatment of eclampsia." They lay stress on the frequency of hypertensive disease, which has not diminished during the last 15 years. Eastman and Whitridge are concise in their statement as to what they mean by hypertensive disease. They say: "Chronic hypertensive vascular disease used to be called 'chronic nephritis' and is often referred to by internists as 'essential hypertension'; but, by whatever name it is designated, the clinical characteristics are plain enough. The patient is usually in the upper age groups, in the thirties or late twenties; she is usually a multipara. Before the seventh month of gestation is reached, often during the first half of the process, the patient shows a pronounced elevation of blood-pressure. The hypertension may have existed prior to pregnancy; if so, the early months of gestation bring about an increase in both systolic and diastolic pressure. Albuminuria and abnormalities of the urinary sediment may be absent, the renal function is often normal, cedema is minimal or lacking, and the patient has no complaints other than occasional headaches. But the hypertension persists, usually at a fairly constant level. At this time only one other positive finding may be noted, and that is narrowing and tortuosity of the retinal vessels; in other words, a retinal arteriolar sclerosis. The pregnancy may proceed to the expected date of confinement, or, as commonly occurs, the fetus may die in utero and be expelled prematurely. In either event the child is underweight, while the placenta shows an unusual number of infarcts, often red infarcts. After delivery there may be a slight recession in the blood-pressure, but usually it remains indefinitely at a figure only slightly below that observed during pregnancy. Each subsequent pregnancy adds its increment to the hypertension, and, as a rule, the

exacerbation in the blood-pressure occurs earlier and earlier in each succeeding pregnancy. In most of these patients the hypertension and the arteriolar sclerosis persist for years without other findings; some show a more malignant course. Sooner or later, however, all manifest certain organic changes. The largest group, probably, show renal alterations: albuminuria and a rather rapid diminution in renal function. Once the latter sets in, the course is a short one and death ensues, often within a few months, from uræmia. Another class of these hypertensive patients, possibly almost as large as the renal group, manifest cardiac changes: hypertrophy, occasional attacks of decompensation, and finally fatal heart failure. In a third group, characterized usually by severe hypertension, death results from apoplexy."

W. J. Dieckmann and S. Kramer⁴ state that a sudden increase of albumin in hypertensive patients should suggest impending fetal death, which is often secondary to placental changes. Their series of 526 patients are divided into 50 per cent pre-eclampsia, 42 per cent hypertensive disease, and 8 per cent chronic renal disease—this series again stresses the importance of hypertensive disease in pregnancy. They give figures showing that the still births and neonatal deaths increase with the amount of protein in the urine. The still-birth rate is least in pre-eclampsia and highest in nephritis, hypertensive disease occupying an intermediate position. Brown and Dodds had a foetal and neonatal mortality of 16 per cent in their whole series of 239 cases. But if the initial blood-pressure was 150/100 or more, only 32 per cent of the infants survived. Dieckmann and Kramer's hypertensive patients usually developed albuminuria after the 28th week, when the blood-pressure also tended to rise.

As regards treatment of hypertensive patients, they point out that the fœtus is usually small, and so they give glucose in quantity from early in pregnancy in the hope of increasing the size of the placenta and fœtus. The patients are instructed to rest in bed for 10 hours at night and for 1 hour each morning and afternoon. The diet contains 2000 calories, and fats are reduced so that the patient's weight only increases by 225 g. (half a pound) each week. The protein intake is at least 80 g. and is derived from meat, milk, and eggs so as to get an adequate vitamin intake. Vitamin E was not found to be of any value in preventing foetal death. One to three grains of thyroid is given daily throughout the pregnancy. If œdema occurs, the diet must contain only minimal amounts of sodium and chloride, hence table-salt and baking powder must not be used. They also exclude salt butter, biscuits, cheese, tinned soups, sausages, salted meats and fish, prepared salad dressings, beer, and stomach powders. They note that there is a very low sodium content in flour, cream, macaroni, sugar, potatoes, parsnips, lettuce, kidney beans, tomatoes, and most vegetables and cereals. Eggs, meat, beets, Brussels sprouts, sweet corn, mushrooms, peas, and spinach are reasonably low in sodium content and are allowed in moderate quantities. Boiling meat gets rid of salt if the broth is not used. If an increase of weight indicates water retention, ammonium chloride, 15 gr. in gelatin capsules, may be given 8 times a day for 5 days to aid sodium excretion.

Dieckmann and Kramer formulate the following rules:—

"Since pre-eclampsia is caused by the pregnancy and since hypertensive and renal disease are usually made worse by pregnancy, it seems obvious that termination of the pregnancy may be necessary. The following criteria are indicative of severe toxæmia. The patient must be carefully observed, and if labour does not ensue termination of the pregnancy is usually necessary.

"*Group A Criteria.*—The systolic blood-pressure is constantly 170 mm. of mercury or shows a persistent daily increase. The proteinuria exceeds 5 g. in twenty-four hours or the qualitative test of the twenty-four hour urine is 3 plus. The weight gain exceeds 100 g. a day. Severe œdema occurs suddenly.

"*Group B Criteria*.—Cerebral, visual, or gastro-intestinal symptoms arise. Oliguria, anuria, or hæmaturia occurs. Jaundice develops. The blood non-protein nitrogen is 50 mg. or more per 100 c.c. The pulse-rate is 120 or more. Œdema of the lungs or cyanosis is present.

"The blood shows an increasing concentration, as indicated by an abnormally high or increasing hæmoglobin, cell volume, serum protein concentration, or specific gravity.

"Gestation of twenty-six weeks or less should be terminated if more than one of the criteria listed are present or if there is no appreciable improvement after seven days of adequate treatment.

"Gestation of twenty-seven to thirty-one weeks should be treated medically until the thirty-second week, unless some *B* signs develop or the *A* signs persist despite treatment or increase in degree.

"Gestation of thirty-two to forty weeks, if *B* signs are absent, should be treated medically until the cervix is 'ripe', when induction of labour will be successful. If the *A* signs increase in degree or if any of the *B* signs appear, the pregnancy should be terminated either by (1) rupture of the membranes and/or insertion of a bag, or (2) Cæsarean section if the cervix is uneffaced."

Howard Taylor⁵ reviews the relation of hormones to the toxæmia of pregnancy and notes that different workers sometimes get contradictory results. Chorionic gonadotropin (anterior pituitary-like substance) is said to be increased in the blood and the urine in toxæmic patients. For example, George and Olive Smith found that in 67 cases of normal pregnancy there was no instance of raised chorionic gonadotropin in the serum, whereas out of 100 cases of pre-eclampsia and eclampsia 85 showed high values. This finding is confirmed by a majority of workers, although Taylor and others disagree.

The excretions of the oestrogens is low in severe toxæmia, and it has been stated that the decrease affects the œstriol and œstrone more than the œstradiol.

Pregnandiol, the excretion product of progesterone, is low in the urine of toxæmic patients as a rule although occasional exceptions occur.

The excretion of androgens has been reported to be unchanged in pregnancy, both normal and toxæmic, by the few who have worked on the subject.

If the above findings are confirmed it is possible that toxæmia may be due to a deficiency of oestrogens and of progesterone or to a toxic body resulting from their destruction. An alternative view is that the oestrogens and progesterone are chiefly produced in the placenta and modified in the liver, and hence the alteration in the hormonal excretion may be only a sign of placental and liver damage.

On the assumption that pregnancy toxæmia is the direct result of hormonal deficiency, many attempts have been made to treat the disease by the administration of oestrogens and progesterone. Taylor took 9 toxæmic patients and treated them for a week by rest in bed, sedatives, and a restricted intake of sodium and water; he then gave them progesterone (450 mg.) and large doses of œstradiol benzoate, but no effects on the blood-pressure, weight, daily urine volume, or albuminuria were noted.

During normal pregnancy, but especially in toxæmic pregnancies, there is sodium and water retention and more or less marked œdema. Experimentally it is found that, in animals, the administration of oestrogens and progesterone is followed by sodium retention, hence it is possible that the normal high concentration of hormones which is associated with pregnancy may account for the water and sodium retention. In a normal puerperium the œstrogen excretion reaches a low level for the first time on about the 4th day, and it has been found that there is a pronounced loss of sodium on the 3rd, 4th, and 5th days

of the puerperium; this puerperal loss of sodium can be prevented by administering oestrogens and progesterone soon after delivery in the case of a normal labour. In the case of a labour complicated by toxæmia the post-partum loss of sodium is usually much greater and cannot be prevented by giving hormones. It thus seems conceivable that the oestrogens and progesterone may be factors in facilitating sodium and water retention in cases of pregnancy toxæmia.

K. W. Sewall⁶ states that anæmia is conducive to water retention, and so are avitaminosis and a decrease in the plasma protein.

L. Dexter, S. Weiss, F. W. Haynes, and H. S. Sise⁷ have also published work on hypertension. They made observations on 100 normal pregnant women, 100 patients who had slight generalized oedema uncomplicated by hypertension, and 80 patients with hypertension during pregnancy. They lay stress on alterations of the body-weight during pregnancy, and state that the average increase of weight during pregnancy is 21 lb., and, since this is more than the weight of the uterine contents, some of it must be due to an increase of fat and retention of fluid. L. C. Chesley (*see below*) states that 6½ litres of fluid are gained by the end of pregnancy. They recognize "hypertension uninfluenced by pregnancy", and record that of 39 patients who had hypertension or albuminuria before pregnancy, 20 had no increase in blood-pressure or in albuminuria although 12 developed generalized oedema. They state that "although the mother fares well, there is a high incidence of miscarriage and still-birth in this group". The remaining 19 women who had hypertension which antedated pregnancy developed toxæmia with an accentuation of the hypertension or albuminuria—this condition they term "toxæmia superimposed on pre-pregnant hypertension", but the authors make their conclusions difficult to follow as they include cases of chronic pyelonephritis and chronic glomerulonephritis among the hypertensives. They did not detect hypertension or water retention in the newborn babies of toxæmic and oedematous mothers. Their follow-up indicates that the duration of the vascular disease rather than its severity is important in giving rise to permanent disease in the mother, and they advise terminating the pregnancy if the patient is not better after 3 weeks of conservative treatment for the toxæmia (this is a figure which is generally agreed on). In treatment they agree with the suggestions already detailed above, including the use of ammonium chloride in 1-g. doses 6 times daily for 3 days and repeated after an interval of 3 days to aid in the excretion of sodium. As an alternative they suggest 2 g. of potassium chloride thrice daily.

L. C. Chesley⁸ estimated the extracellular water by the thiocyanate method. He has studied 442 patients, and gives details of what seems a long and difficult technique carried out at different periods of pregnancy from the 8th to the 40th week. He concluded that there is a gradually accelerating rate of water gain. The total gain up to the 34th week averages 5 litres; after the 32nd week there is a greatly increased average rate of available water gain. Practically all of it represents hydration of the maternal tissues. In the last weeks of pregnancy many patients lose water; this loss may be correlated with the well-known weight loss often occurring just before delivery.

The Value of Vitamins in Preventing Toxæmia of Pregnancy.—Gordon King⁹, working in Hong Kong, drew attention to the high proportion of patients suffering from beri-beri (avitaminosis B₁) complicating pregnancy and labour who developed a pregnancy toxæmia. Of 155 patients with beri-beri, 117 had a blood-pressure of 140/90 or over, including 16 cases of eclampsia. Thus the proportion of eclampsia is increased 50 times in this series of patients suffering from avitaminosis B₁, and this high proportion occurring in patients known to be deficient in vitamin B₁, suggests that avitaminosis B₁ may be a cause of pregnancy toxæmia in other women who have not other symptoms of B₁.

deficiency. W. Nixon, M. Wright, and E. Fieller¹⁰ found that the amount of vitamin B₁ in the urine and in the placenta was lower in eclamptic women than in normal patients.

In 1938 R. Ross and others¹¹ tried giving vitamin B in the form of yeast extract to pregnant patients taking a rather poor diet. The number observed was only 27, but the incidence of toxæmia did not differ markedly from that in a control group who did not receive the yeast. F. J. Browne¹² gave 3 mg. of vitamin B₁ (aneurine hydrochloride) daily to patients under 20 weeks pregnant, and continued the treatment daily till term. The 3 mg. of aneurine hydrochloride is equivalent to 960 International Units. His series consists of 88 treated patients and 81 controls, and the incidence of toxæmia was found to be slightly higher in the treated patients than in the controls. Browne concludes that, so far as the prevention of the toxæmia of pregnancy is concerned, no beneficial effect is obtained by supplementing the diet with vitamin B₁. A. Siddal¹³, using intramuscular injections of 6·7 mg. of vitamin B₁ daily, came to the same conclusion. His report was on 20 cases of pre-eclamptic toxæmia treated with vitamin B₁ daily. He found that there was no greater or quicker improvement in these patients than in those treated by rest in bed only. M. Strauss¹⁴ injected 20 mg. daily but found no improvement in 3 patients with toxæmia of pregnancy. R. Kapeller-Adler and J. Cartwright¹⁵ review the literature, and quote Spitzer, who recorded 8 cases of hyperemesis gravidarum successfully treated by daily injections of 10 to 20 mg. of 'Benerva Roche'. L. McGoogan¹⁶ advises 50 to 100 mg. of vitamin B₁ daily in cases of severe polyneuritis of pregnancy, and did not observe any bad effects from the large doses given. Kapeller-Adler and Cartwright gave vitamin B₁ by injection of 10 mg. daily or by oral administration. In a small series of patients suffering from severe pregnancy toxæmia the treatment seemed to accentuate the symptoms. Further observations were made which seem to indicate that aneurine may influence the histamine metabolism during pregnancy and this may be the cause of the increase in the toxæmia and hence the therapeutic use of vitamin B₁ in toxæmia is to be discouraged.

E. Shute¹⁷ of Ontario has published a series of papers dealing with the blood-œstrogen level in toxæmia and especially in cases of accidental hæmorrhage. He believes that the earliest sign of toxæmic accidental hæmorrhage is the presence of small areas of tenderness on the wall of the uterus which are due to small areas of placental detachment. These small detachments if untreated will, he thinks, lead to severe separation of the placenta. He therefore diagnoses slight separation of the placenta from the presence of the local areas of uterine tenderness together with the blood-œstrogen test being 'positive', and treats such patients by the administration of vitamin E daily till the end of pregnancy. It should be noted that such treatment is quite useless for an acute case of either concealed or external accidental hæmorrhage seen for the first time when the patient is seriously ill. He suggests that vitamin E given continuously from the time when the symptoms and signs are slight should prevent the occurrence of serious cases. He uses Kelly's wheat-germ oil and gives from 2 teapoonfuls upwards as a daily dose. Some patients who were intolerant of wheat-germ oil were given epylnal in doses of from 9 mg. daily up to 100 mg. daily. The expense of wheat-germ oil even in bulk is one of the difficulties of this method of treatment, and the dosage seems to be very large compared with the usual dose of 3 min. in a capsule given twice daily which is usual in this country in cases of threatened abortion.

A. M. Hain and J. C. B. Syme¹⁸ report a small series of cases in which vitamin E was used to control menopausal flushes. Several patients seemed to have derived remarkable benefit. The preparation used was Viteolin (Glaxo), and 2 capsules were given daily for about a fortnight till the flushes were markedly

improved, and then 1 capsule was taken daily for several weeks. Small doses should be continued for some time after the symptoms are alleviated. One patient had pruritus vulvæ in addition to the flushes. Œstrogen therapy had been tried and had failed. Both the flushes and the pruritus stopped under Viteolin and the treatment was stopped. Later the pruritus returned and further treatment with Viteolin was necessary.

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PREGNANCY: XENOPUS TEST FOR.

Clifford White, M.D., F.R.C.P., F.R.C.S., F.R.C.O.G.

Owing to the increased cost of rabbits during war time, the use of the African clawed frog (*Xenopus laevis*, Daudin) as a means of performing the biological test for pregnancy has become increasingly popular and the question of the reliability of the test compared with the Friedman test becomes one of importance. A. I. Weisman, A. F. Snyder, and C. Coates¹ report a series of 267 patients tested, of whom 154 also had a rabbit test performed and 113 were tested only on the frog. The patients were followed up to see if the signs of pregnancy subsequently became obvious. Of the 154 cases, the frog test was accurate in 100 per cent and the rabbit test in 96 per cent. In the 113 patients tested on the frog only, the result was accurate in 99.6 per cent. It should be noted that many workers would regard the figure of only 96 per cent of correct diagnosis with the rabbit test as a poor result and would expect to obtain a higher percentage of correct results under normal working conditions; but it is now of importance to recognize that the *Xenopus* test can—in proper hands—give results as good as those obtained by skilled workers who used rabbits.

The test depends on the adult *Xenopus* frog carrying eggs throughout the year but only extruding them during mating or after the injection of prolan-A-like bodies. The method of carrying out the test is that three groups of frogs are kept in the laboratory: the first consists of frogs which have given a positive reaction and are being allowed a month's rest before being suitable for use again; the second group consists of those which gave a negative reaction and are being rested for one week before again being used; and the third group consists of frogs suitable for immediate use. The test is performed by taking urine, extracting with acetone, filtering, and drying. The hormone is soluble in water and so can be separated from the less soluble constituents of urine by adding water and centrifuging. One c.c. of the watery fluid is injected into the dorsal lymph-sac of the frog. The frog is then placed in a glass aquarium fitted with a gauze floor which permits the eggs falling through the meshes so that they are not disturbed or eaten by the frog. If the test is positive the eggs are extruded within 18 hours, but if eggs are not seen within that time a negative result is reported. The authors of the article give as advantages of the frog test that it is quick in giving a result, accurate, simple to perform, the animals are easily obtained and kept, they are inexpensive, and the method of reading is easy.

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PROSTATE, CARCINOMA OF.

Hamilton Bailey, F.R.C.S.

Castration and Diethylstilbœstrol Treatment.—This year has brought scores of papers substantiating the claims by C. Huggins and his co-workers in 1941 that castration or castration plus the administration of diethylstilbœstrol often

results in dramatic (*Fig. 25*), if temporary, relief in cases of prostatic carcinoma. Diethylstilbœstrol increases the castration effect, giving a much more rapid and marked effect than castration alone (R. Chute et al.¹). The quickest and most satisfactory results were obtained by castration followed by injection of 10 mg. of diethylstilbœstrol daily for ten days.

Orchidectomy for prostatic enlargement was suggested by J. W. White in 1893.² White's work died in its infancy, mainly because of baseless rumours that castration caused mental deterioration. Nevertheless, it must be appreciated that White recommended castration for senile enlargement of the prostate,

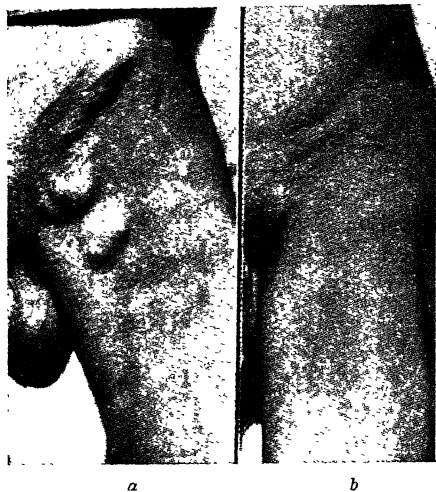


Fig. 25.—*a*, Secondary deposits in the inguinal glands from carcinoma of the prostate; *b*, The same patient 107 days after bilateral orchidectomy. (*Reproduced from the "Annals of Surgery."*)

and there is no evidence that orchidectomy influences benign hypertrophy. A small percentage of White's patients were benefited, perhaps, as E. P. Alyea and A. F. Henderson³ suggest, because those patients who improved were cases of unsuspected carcinoma and not benign hypertrophy. Similarly, it is suggested that the occasional good results which follow deep X-ray therapy in cases of prostatic carcinoma are due to accidental irradiation of the testes.

After castration, libido and the power of erection disappear, but there are no other harmful effects (R. Chute and A. T. Willetts⁴).

Acid phosphatase is an enzyme present in many tissues in small quantities, but abundantly present in the normal human prostate. In cases of carcinoma of the prostate, particularly when metastasis has occurred, the amount of acid phosphatase in the blood serum is greatly raised (A. B. Gutman⁵).

If, therefore, a patient with carcinoma of the prostate shows a reduction of acid phosphatase in the serum, it is indicative that the neoplastic process has undergone a corresponding regression. This test, in conjunction with clinical data, is the basis of a remarkable advance in the treatment of a hitherto extremely depressing chapter in genito-urinary surgery.

A. Strachstein⁶ finds that orchidectomy in cases of inoperable carcinoma of the prostate often brings spectacular relief. The patient puts on weight and has general relief of pain in the metastatic areas. Even the obstruction to the prostatic urethra is often relieved considerably.

E. P. Alyea and A. F. Henderson,⁷ reporting 40 cases, found the immediate result was often miraculous. The patients' general well-being improved, and in a few weeks one man gained 50 lb. in weight; another gained 35 lb. A large number of patients in this series had transurethral resection for the relief of partial or complete urinary obstruction. Bone metastases and pulmonary metastases, as shown by X-ray evidence, shared in the regression.

W. C. Quinby⁸ instances results which are "quite phenomenal". The most striking benefit was the relief of symptoms due to metastatic deposits. In several cases patients partially paralysed by pressure on the spinal cord and nerve-roots were freed from pain and were again able to walk.

CARCINOMA OF THE PROSTATE

(E. HESS)

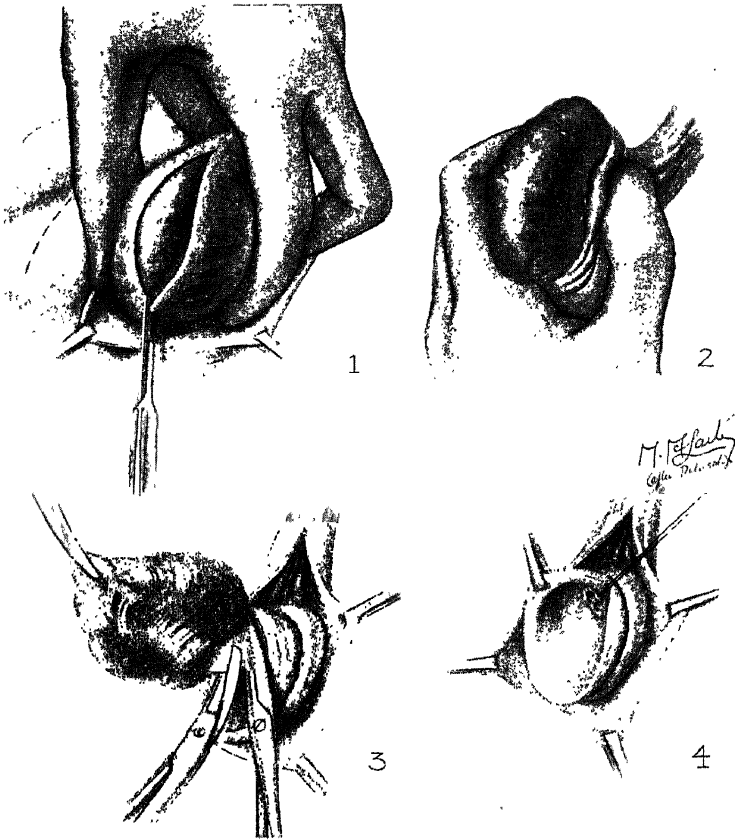


Fig. A.-The technique of removing all the spermatogenic tissue from the testicle.

PLATE XXVI

CARCINOMA OF THE PROSTATE—continued

(C. D. CREEVY)

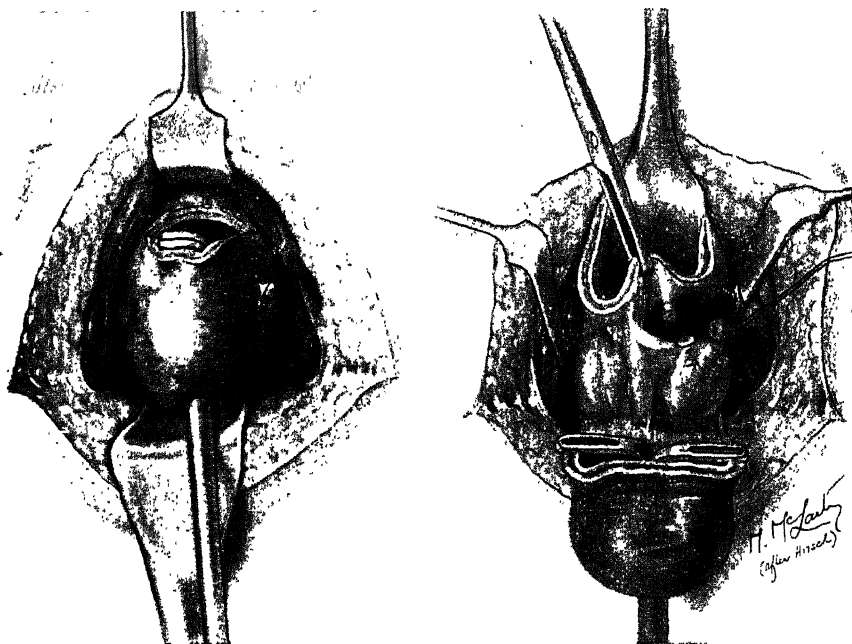


Fig. B.—a, The apex of the prostate has been freed, Young's prostatic retractor inserted, and the anterior wall of the bladder is incised; *b*, Ligation of the vasa and removal of the vesicles after separation of the bladder.

C. Huggins⁹ found that extensive osseous metastases completely disappeared in 4 cases.

In 75 cases reported by R. M. Nesbitt and R. H. Cummings¹⁰ improvement occurred in 73 per cent. These patients showed regression of the primary neoplasm and freedom from pain; they voided urine satisfactorily and gained weight.

Failures and Disappointments.—Of R. M. Nesbitt and R. H. Cummings's¹⁰ patients, 33½ per cent, after showing some improvement, pursued a downward course. No improvement occurred in any of the latter group following the administration of diethylstilbœstrol. Chute and Willetts⁴ have not been able to detect evidence of regression of bony metastases as has been described. Indeed, X-ray films showed that the bone metastases were progressing as usual.

According to C. Huggins,⁹ a great deal depends upon the histology of the tumour. The undifferentiated type shows little or no response to orchidectomy. It is the adenocarcinomata which respond. Small atrophic testicles, when removed, do not give the same results as castration in normal-sized organs. The occurrence of hot flushes is a favourable prognostic sign, and there is no contra-indication to suppressing them with small doses of diethylstilbœstrol.

Overcoming the Patients' Objections.—H. L. Tolson¹¹ finds, with so many others, that it is difficult to persuade these patients to sacrifice their testicles. E. Hess¹² says that Huggins's technique is to remove all the testis except the epididymis (Plate XXV) and then to suture the tunica vaginalis over the epididymis, leaving so-called testicles in the scrotum. Chute and Willetts⁴ make a generous incision into the tunica albuginea and by gauze dissection remove soft, stringy, tan-coloured testicular substance down to the mediastinum testis. Here the blood-vessels, which form a sort of pedicle, are clamped and ligated and the remainder of the testicular substance is cut away. The incision in the tunica is then sutured.

H. L. Tolson,¹¹ after removing the contents of the tunica albuginea, places models made of acrylic resin fashioned by a dental mechanic in each tunica albuginea, which is closed over the prosthesis. Vasectomy is performed. Thus bilateral orchidectomy can be performed without altering the appearance of the scrotum. C. E. Rea¹³ advocates lucite for testicular prosthesis. The material is light, semi-translucent, and has a polished surface. It is sterilized by washing with soap and water and leaving in alcohol for half an hour before using.

Diagnosis of Carcinoma of the Prostate.—C. D. Creevy¹⁴ says that the earliest carcinoma of the prostate which is recognizable clinically appears as a small, stony-hard, irregular, poorly circumscribed nodule not producing any symptoms, although obstruction to micturition may be due to associated benign hypertrophy. In such cases a radiograph is essential to eliminate the possibility of the hard area being due to prostatic calculus; prostatic calculi are visible on an X-ray examination. It must be remembered that cancer and calculi can co-exist.

E. W. Riches¹⁵ remarks that every student knows carcinoma of the prostate may be associated with metastases in bone, but lymphatic spread is more important in 73 per cent of cases. Metastases occur in lymphatic glands, notably the internal iliac group; they occur in the viscera in 84 per cent; while in bones the incidence is in fact only 28 per cent.

A. Strachstein⁶ agrees that at times it is impossible to differentiate Paget's disease of bone from bone metastases due to carcinoma of the prostate. Radiologically the two conditions can give exactly the same appearance. Metastases from carcinoma of the prostate are most commonly situated in the sacrum and adjacent portions of the spine and pelvis.

F. C. Hamm¹⁶ finds that needle biopsies may be of value in diagnosing early carcinoma of the prostate, though a negative result cannot be regarded as

conclusive. A more dependable method is to expose the gland through a perineal approach and remove the suspicious nodule for examination by frozen section.

Curative Treatment.—Transurethral resection, despite its immense value as a palliative measure, does not offer any hope of cure. The same may be said of enucleation, although the occasional small carcinoma enclosed in a benign hypertrophy may thus be eradicated. The only method which can be said to offer a definite prospect of a cure is Young's radical perineal prostatectomy (*Plate XXVI*), which shows just under 50 per cent of five-year cures in 115 cases performed by Young and his associates (C. D. Creevy¹⁴). F. C. Hamm¹⁶ says that complete removal of the prostate with its capsule and a collar of the bladder neck offers the only hope of cure. This can only be done through the perineum. The ideal case for a radical operation is that with a single carcinomatous nodule not more than 1 cm. in diameter. E. Belt¹⁷ has practised total excision of the prostate by the perineal route in cases of early carcinoma of the prostate for over 20 years. Fifty-eight per cent of 50 cases operated upon have been spared death from prostatic cancer. He gives details of the steps of the operation, which is well illustrated.

REFERENCES.—¹*J. Urol.* 1942, 48, 682; ²Annotation, *Lancet*, 1943, 1, 177; ³*J. Urol.* 1942, 48, 673; ⁴*New Engl. J. Med.* 1942, 227, 863; ⁵*J. Amer. med. Ass.* 1942, 120, 1112; ⁶*J. Urol.* 1943, 49, 118; ⁷*J. Amer. med. Ass.* 1942, 120, 1099; ⁸*New Engl. J. Med.* 1942, 227, 512; ⁹*Ann. Surg.* 1942, 115, 1192; ¹⁰*J. Amer. med. Ass.* 1942, 120, 1109; ¹¹*J. Urol.* 1943, 49, 125; ¹²*Ibid.* 1942, 48, 703; ¹³*Ibid.* 1943, 49, 727; ¹⁴*J. Amer. med. Ass.* 1942, 120, 1102; ¹⁵Meeting of Faculty of Radiologists, 1943, Jan. 16; ¹⁶*J. Urol.* 1942, 48, 174; ¹⁷*Ibid.* 287.

PSYCHIATRY. (See MENTAL DISORDERS; SOCIAL ASPECTS OF PSYCHIATRY; WAR PSYCHIATRY.)

PSYCHOLOGICAL TESTS.

Aubrey Lewis, M.D., F.R.C.P.

Psychological tests are increasingly used to aid in the diagnosis of cerebral damage or to judge its degree. It is doubtful, however, whether this is as yet a clinically useful procedure, except in very expert hands. An extensive research into the matter has been made by E. L. and V. Trist¹; they elaborated a battery of tests which throws light on the impairment of mental function in such a disease as G.P.I., and can be utilized for diagnostic purposes. Where there is a deviation score of more than 10, a deviation pattern of seven or more signs, and certain qualitative features of performance (which are too technical for summary description), it is possible to diagnose an impairment of abstract thinking due to organic cerebral disturbance. A negative result of the tests, however, would not exclude organic disease or trauma. M. B. Brody² has also worked on this subject, and collected items for a battery of tests. He emphasizes that intelligent normal persons may exhibit some of the signs characteristic of cerebral impairment.

The psychological methods of studying effects of cerebral trauma, which were introduced by K. Goldstein and his associates,³ have been extended particularly by W. C. Halstead, who now, in conjunction with P. H. Settlage,⁴ reports how groups of geometrical test figures having certain characteristics in common were exposed to normal persons, and to others with cerebral lesions, by means of an ingenious device in which each correct response automatically caused another set of test figures to be presented. All the ten normal subjects spontaneously discovered the correct solution in the standard tests during the first trial. The 6 experimental subjects, who had had a neuro-surgical operation followed by good recovery, showed no significant deviation from the normal in their visual acuity for form, brightness, and colour; three of them had a visual field defect; three of them varied in their degree of co-operation according

to whether they gave a correct response or not; and all had considerable difficulty with the quadrant tests, which were the only test figures that required a changing orientation to a vertical dimension of space. The three subjects who had a primary lesion of one or other frontal lobe made an abnormal number of errors, required assistance, and refused to complete the tests. On the other hand, one subject who had a large lesion in the left parieto-temporal region gave a performance superior to that of the average normal subject, as did also a patient whose right occipital lobe had been removed.

A set of psychological tests for the measurement of mental senescence has been employed by H. Halstead.⁵ The most difficult tests for senile subjects were those in which they had to break away from old mental habits and adapt to unfamiliar situations, whereas they were able to do well on tests of visual recognition and simple motor tasks.

O. L. Zangwill,⁶ finding some of the usual clinical tests of memory unsatisfactory, has employed three simple learning tests to indicate impairment of this function. The first is a modified digit test, the second requires the subject to memorize a short sentence, and the third is a performance test devised by A. Rey.⁷ Zangwill describes some neurotic characteristics which may become manifest when these tests are being carried out and which must be taken into account before determining whether there is organic impairment of memory.

The recognition of neurotic persons, especially for purposes of military selection, can be facilitated by the use of "a personality inventory". J. C. McKinley and S. R. Hathaway⁸ have drawn up a list of significant questions, to which the answer can be "true", "false", or "cannot say"; this list constitutes a formidable inventory. The candidate is asked to state which of the 550 items in the list apply to himself. The responses given by 690 normal persons have enabled McKinley and Hathaway to recognize a neurotic set of answers. They emphasized that the inventory provides much psychiatric information at the cost of very little of the physician's time.

REFERENCES.—¹*Proc. R. Soc. Med.* 1943, **36**, 243; ²*Ibid.*; ³*Handbuch der normalen und pathologischen Physiologie*, 1927, **10**, 600-842, Berlin, Julius Springer; ⁴*Arch. Neurol. Psychiat.* 1943, **49**, 439; ⁵*J. ment. Sci.* 1943, **89**, 363; ⁶*Proc. R. Soc. Med.* 1943, **36**, 576; ⁷*Arch. Psychol. Genève*, 1934, **24**, 297; ⁸*J. Amer. med. Ass.* 1943, **122**, 161.

PUERPERAL UTERINE CONTRACTIONS.

Clifford White, M.D., F.R.C.P., F.R.C.S., F.R.C.O.G.

On p. 377 of the MEDICAL ANNUAL for 1943 an abstract was given of work done by various authors on the contractions of the uterus in pregnancy and labour. W. Bickers¹ has published some further work on the contractions of the uterus during the puerperium. Six normal primiparæ were delivered without the use of analgesic drugs, novocain infiltration and pudendal nerve block being used to lessen the pain. After the completion of the third stage and with elaborate aseptic precautions a rubber balloon was inserted into the uterus and filled with sterile water. The balloon was connected with a kymograph equipped with a timer. The tracings were repeated on the 5th, 10th, and 15th days of the puerperium. The tracings obtained in all of the 6 cases were similar, so that it may be assumed that the tracings represent an accurate picture of the motility of the uterus during the puerperium. After the third stage the contractions were high in amplitude, recurred about once in 3 minutes, and lasted about 70 seconds; on the 5th day the contractions were smaller, occurred every 4 to 7 minutes, and only lasted 30 seconds or less; by the 10th day the uterine motility was practically lost, and by the 15th day each uterus was absolutely non-motile and contractions could not be elicited by increasing the pressure within the balloon or by massage of the uterus. The injection of pitocin produced tetany of the uterus on the 1st and 5th days;

on the 10th day there was a feeble response in two cases only and none responded to pitocin on the 15th day.

Bickers assumes that the loss of motility is due to œstrin depletion, and points out that the amount of œstrin circulating in the blood and excreted in the urine is lower in the middle of the puerperium than at any other time in a woman's reproductive life. He therefore gave 2 of the 6 patients 1 mg. of œstradiol benzoate on the 15th, 16th, 17th, and 18th days of the puerperium. Tracings taken on the 18th day showed a well-marked return of the spontaneous contractions of the uterus, but of greater importance is the observation that after œstrin the uterus gave a well-marked response to pituitrin on the 18th day. It therefore appears that if it is necessary to give an oxytocic drug after the first week of the puerperium, it is well to prime the uterus first with an œstrogen and give the oxytocic after the uterus has been sensitized. This is obviously a point of considerable practical importance in the treatment of hæmorrhage occurring in the middle or late puerperium.

D. P. Murphy,² working on patients who were advanced in pregnancy, found that œstrogens were variable in their oxytocic effect. No reaction occurred prior to the 29th week; after that time the number of patients who responded increased progressively as pregnancy advanced.

REFERENCES.—¹*Amer. J. Obstet. Gynec.* 1942, **44**, 581; ²*Surg. Gynec. Obstet.* 1943, **76**, 446.

PULMONARY ATELECTASIS. (See LUNG, COLLAPSE OF.)

PULMONARY TUBERCULOSIS. (See TUBERCULOSIS, PULMONARY.)

QUININE AND ITS SUBSTITUTES IN THE TREATMENT OF MALARIA.

R. St. A. Heathcote, D.M., F.R.C.P.

As a commencement, it may not perhaps be out of place briefly to recapitulate the life-history of the parasites of malaria. These protozoal organisms belong to the order Sporidia, sub-order Hæmo-sporidia, and family Plasmodiæ. The genus *Plasmodium* includes many species, parasitic in mammals and birds. Of these, apart from some disputed species, as *P. minutum*, *ovale*, *camarensis*, etc., three infect man: *P. vivax* of benign tertian, *P. malariae* of quartan, and *P. falciparum* of subtertian (malignant) fever, respectively. Man forms the intermediate host, in which the asexual stage of the life cycle occurs, and the anopheline mosquito the vector and definitive host, in which the sexual stage takes place.

We may take as the starting-point in the cycle the biting by an infected mosquito of the intermediate host. The parasite is then injected under the skin in the *sporozoite* stage. These make their way into the blood-stream and enter erythrocytes, as *trophozoites*, which after nuclear division are converted into *schizonts*. Now the red cells rupture and many minute organisms are set free into the blood-stream, the *merozoites*. These enter new red cells and start again as *trophozoites*. This, the asexual reproductive cycle, is continuously repeated, taking different periods of time with the different species: *P. vivax* 48, *P. malariae* 72, and *P. falciparum* a variable period of 24 to 48 hours. With the rupture of the red cell, toxic substances are released into the blood, and, when this occurs in sufficient quantity, the characteristic chill and rise of temperature appear. If, through treatment and/or the development of immunity, the conditions in the host become unfavourable for the parasite, a change in the life cycle occurs. Many, or even most, of the trophozoites fail to develop into merozoites but change instead into the sexual forms, the male and female *gametocytes*. These remain in the red cells and undergo no further development in the intermediate host, thus causing no symptoms.

If now such a host with gametocytes in its blood is bitten by a suitable mosquito, anopheline for human, culicine for bird malaria, the gametocytes pass to the insect's stomach. Here, after further changes, fertilization takes place, with the formation of the *zygote*. This in turn undergoes certain developments, ultimately giving rise to large numbers of *sporozoites*, which spread throughout the insect but appear to congregate especially in its salivary glands and ducts. If the insect again gets access to a susceptible host, the sporozoites are injected through the salivary ducts at the time of biting and the whole process starts again. In this connection, it may be pointed out that there are three species of anopheline mosquitos in Great Britain, of which one, *A. maculipennis*, is very widely distributed.

Another point in connection with the disease should perhaps be made here. While, in the acute stages, the fever recurs at, generally, regular intervals, it is well recognized that occasional attacks of fever may reappear at very irregular intervals of time, and long after all exposure to infection has ceased and apparent cure has been brought about. It has been claimed that, in such cases, the female gametocytes, still present in the blood, *can*, as it were, revert in function to the trophozoite stage and so start again the asexual part of the life cycle. This is strenuously disputed by some authorities, who maintain that, unless they can gain access to a suitable mosquito, the gametocytes will in time perish. They explain these irregular attacks by saying that the asexual stage has been continuously progressing during the period of freedom from fever but that there has not been sufficient of the toxic substance released into the blood-stream to cause an acute attack. In either case we have to deal with an acute attack of the disease superimposed on the so-called chronic malarial condition. For the present purposes it is immaterial which of the two explanations is correct, it being desired only to put the practitioner on his guard so that he may recognize that irregular bouts of fever of obscure origin occurring in a patient who has lived in a malarial region may be due to a recurrence of acute malaria.

Many indeed are the malarious countries in which the armed forces of the Crown have been, still are, or probably may be engaged during this present war. It is only to be expected that, in spite of all the care expended in prevention, many men will suffer from the disease. After the present, as after the last, war, a large aggregate number, though perhaps a small proportion only of the whole, can be expected to return to this country still harbouring the parasite, chiefly in the gametocyte form. In 1919-21, some hundreds of cases of indigenous malaria were reported, mostly from S.E. England, and it was thought that these owed their infection to the spread by the anopheline mosquito of parasites from the blood of returned malarial soldiers. There are therefore two aspects of the question to be considered—first, the cure of the individual, and second, the prevention of the spread of the disease.

For the past three hundred years or more, cinchona bark and its constituent alkaloids have been the standby in the treatment of malaria. Several species of this genus occurred wild in S. America, and may indeed in small numbers do so still. The main source of the bark, however, for many years has been the plantations in the Dutch East Indies, especially in Java. The tree is cultivated in other countries, e.g., India, but it is undoubtedly true that the vast bulk, probably nine-tenths, of the world supply came from these islands, and, with the Japanese occupying them, the world at large has been deprived of quinine. How long it may be after the expulsion of the enemy before the plantations come again into bearing, the present writer can form no conjecture, but for several years to come we may well have to rely on substitutes for quinine. Fortunately these have been found, and can be divided into two classes, the derivatives of quinoline and of acridine, respectively. These substitutes were discovered

in Germany, largely as a result of that country's deprivation of quinine in the last war through the allied blockade. It is perhaps an example of 'poetic justice' that we, now deprived of quinine by the action of Germany's ally, should be enabled to cope with malaria in the present war as an indirect result of our actions during the last.

The different species of *Plasmodium*, the various strains of the same species, and the parasites themselves at different stages of the life cycle, have long been known to vary in their susceptibility to quinine. From the point of view of treatment of the individual, it is the asexual stage which must be attacked, while, from the preventive aspect, the patient must be rendered unable to infect the mosquito by freeing his blood from the gametocytes. Incidentally, no means of attacking the parasite in the mosquito is known, and preventive measures in this direction must be confined to destroying the mosquito and/or its larvæ in their respective haunts.

In acute attacks of tertian or of quartan fever, quinine in a daily dose of about 20-30 gr. for seven to ten days will, in a large proportion of cases, cause, at least temporarily, complete remission of the attacks. It acts upon both the trophozoite and the gametocyte form of the two species of *Plasmodium*. Unfortunately relapses are very frequent, up to as much as 50 per cent sometimes in quartan fever. Continuation of quinine for a further 8 or more weeks in a smaller dose, say 10 gr. per day, will probably reduce the relapse ratio very materially, but this seems unnecessarily wasteful of quinine. Repetition of the original course at each relapse will ultimately give permanent cure in most cases.

As a substitute for quinine, the acridine derivative, mepacrine (atebrin), is used in a dose about one-sixth as large as that of quinine (5 gr. per day). The effects come on rather more quickly and last rather longer after cessation of treatment than with the latter, while the general results seem to be at least equally as good, or rather better, as the relapse rate is generally thought to be somewhat reduced.

In subtertian fever, quinine must be given in about double the dosage, 50 gr. per day for about the same period. Variations in the susceptibility of different strains of *P. falciparum* occur and make for a certain degree of confusion in results. Complete cessation of symptoms is however to be expected, and after thorough treatment relapse is less likely to occur than in the other forms of the disease. The action of the drug is entirely on the trophozoites, the gametocytes being completely unaffected. Again, in this form of the disease mepacrine acts in the same manner as, and with efficiency equal to that of, quinine.

From the point of view of treatment, then, mepacrine is no less effective than quinine. It is official in two forms, the hydrochloride for oral, the methanesulphonate for intramuscular, administration. It is really a dye, and is of a bright yellow colour which imparts its tint to the skin, simulating jaundice. Apart from this minor disadvantage, it can cause other slight toxic effects, as gastro-intestinal symptoms, nausea, vomiting, and rarely diarrhœa. Effects on the central nervous system have been described, headache, insomnia, epileptiform fits, and even psychoses. If administration were unduly prolonged, toxic action on the liver might be feared, as with other acridine derivatives, but the present writer has met with no mention of this. It would be well to exercise special care however in the treatment of persons already showing signs of previous renal and hepatic injury. Generally speaking, it may be fairly claimed that mepacrine is a complete substitute for quinine in the attack on the asexual forms of all, and on the sexual stage of two, of the malarial parasites.

From the preventive aspect, destruction of the gametocytes is needed. While quinine and mepacrine have some action on these forms of both *P. vivax* and *P. malariae*, neither has any on those of *P. falciparum*. On the other hand

certain derivatives of quinoline are completely devoid of action on the trophozoite stage but attack vigorously the gametocytes of all three species. Many of these derivatives have been made, and of these plasmoquin, official since 1941 as a complex salt under the name pamaquin, is probably the most efficient. As this attacks the gametocytes and quinine and mepacrine the trophozoites, it would seem evidently advisable to use a combination of the drugs in the treatment of any case of malaria in which it might be expected that both forms of the parasite would be present. In fact, there are advantages to be gained by giving quinine with pamaquin, as the toxic effect of the latter seems to be reduced by the former. Unfortunately, this does not hold good with mepacrine, as there is much evidence that the combination of this with pamaquin increases the frequency and severity of toxic phenomena. It is possible, however, to use mepacrine for, say, 7 to 10 days, wait for two or three days, and then give pamaquin.

Unfortunately the effective dosage of pamaquin lies very near the toxic. As little as $2\frac{1}{2}$ gr., or even less, daily for ten days may produce unpleasant symptoms in as many as 40 per cent of the patients. The most prominent of these is cyanosis, due to the formation of methæmoglobin. This, coupled with the destruction of red cells by the parasite, may lead to anæmia. Other effects are asthenia, vomiting, dizziness, urticaria, etc. In a few cases acute hæmorrhagic nephritis and parenchymatous necrosis of the liver have been recorded. The latter has of course often occurred in connection with other quinoline derivatives, notably cinchophen (atophan), phenylquinoline-4-carboxylic acid. Similar effects have been produced in monkeys by administration of pamaquin in comparable doses. Care must evidently be employed in the use of these quinoline drugs, but at present they are the only substances known which can destroy the gametocytes of *P. falciparum*. The daily dose of the salt pamaquin should not exceed $\frac{1}{2}$ gr., or at most $1\frac{1}{2}$ gr., corresponding to $\frac{1}{2}$ to $\frac{3}{4}$ gr. of plasmoquin, and the course should not extend over more than a fortnight continuously. Larger doses may be given for shorter periods.

In addition to this specific treatment of the disease, other remedies may be called for. Adrenaline has been used, especially perhaps in Italy, to cause contraction of the spleen, thus forcing the parasites out into the circulation where they can be attacked by drugs. Anæmia is very common in the case of chronic malaria, and for this iron and arsenic are traditionally employed. It seems probable, however, that liver extracts might be well employed in addition to hasten the production of red cells.

RADIOLOGY : DIAGNOSIS.

James F. Brailsford, M.D., Ph.D., F.R.C.P., F.I.C.S.

BONES AND JOINTS

Osteoclastoma (Plates XXVII-XXIX).—The tumour shows a typical radiographic appearance, usually in the extremity of a bone of a young adult, more commonly in the lower end of the radius, femur, or tibia, or the upper end of the tibia, but it has been seen at many other sites. The tumour slowly dissolves the bone as it progresses. It does not infiltrate the bone in the way sarcoma does, consequently the adjacent bone retains its normal characters and its borders show no increased density to indicate reaction. The line of demarcation between tumour and normal bone is often clearly defined. As the tumour extends the bony wall beneath the periosteum is gradually dissolved and when reduced to a sufficient thinness bulges with the expansion of the tumour. At this stage, but not before, a periosteal reaction in the shape of a thin periosteal accretion of new bone may be delineated. Ultimately this bony wall may be completely

absorbed. The subarticular bone appears to be more resistant and the articular cartilage is usually still intact when the tumour is first detected. As a result of the decalcification the stability of the bone is impaired and spontaneous fracture may be the first indication of the presence of the tumour. Disuse or infection may produce additional changes in the radiographic picture. There are certain lesions of bone which present radiographic features which may be mistaken for those of this tumour, e.g., multilocular cyst, osteitis fibrosa cystica (simple or due to hyperparathyroidism), chondroma, single lesions of polyostotic fibrous dysplasia, plasmocytoma or solitary myeloma, certain sarcomata, secondary carcinomata, and tuberculosis. The characteristic radiographic appearances of these have been described elsewhere.^{1,25} The experience of the reviewer is that the typical radiographic picture described above is always associated with the histology of the tumour variously called osteoclastoma, myeloid sarcoma, myeloma, or giant-celled sarcoma; in other words, to the experienced observer the essential histology can be anticipated from the radiographic appearances. Faced with the clinical and radiographic evidence of such a tumour in one of those sites, the practice being urged to-day is biopsy of sufficient extent to permit of careful histological examination of all parts of the tumour. Certainly biopsy permits of examination of the histological structure of the tumour, but it has important limitations and disadvantages, e.g.—

1. It does not reveal any additional features; it merely confirms the radiographic evidence; it may be very misleading.

2. It weakens the stability of the bone, may fracture the bone, or damage the joint surface, and make amputation appear essential (*Plate XXVII, Fig. C*).

3. It removes the scaffolding on which repair can be built up and so delays restitution (*Plate XXVII, Figs. C, D*).

4. It fails to reveal whether the tumour will form metastases or not. Tumours presenting the same histological structure may be eradicated by local curetting or may metastasize and kill the patient (*Plate XXIX, Fig. A*).

5. It may actually disseminate the tumour cells.

6. It is an added risk to the patient (anæsthetic, the complications of sepsis, and recurrence).

7. There is evidence which suggests that the surgical trauma may incite malignant metaplasia in some cases.

TREATMENT.—

Surgery.—In those early cases in which but a localized section of the bone is involved, localized evacuation of the tumour cells from the bone, followed by carbolization of the walls, has been a common procedure. This has been followed by slow consolidation and apparent cure, but I have seen cases in which such a tumour has recurred at the site 15 to 20 years after, and though amputation was performed the patient died from metastases. In some cases in which the local evacuation appeared to be most thorough the tumour has extended so considerably within a few months that amputation has been regarded as essential, but in spite of this being promptly executed metastases developed and death ensued (*Plate XXIX, Fig. A*). Even in the so-called successful case the damage to the bone by the surgery markedly impairs the stability of the bone, and fractures or deformities of the joint surfaces are produced resulting eventually in traumatic arthritis (*Plate XXVII, Fig. D*). The removal of so much tissue necessitates a long period of restitution—I have known it take more than 6 years for union of fragments to occur (*Plate XXVII, Fig. C*). In those cases where the tumour has so extensively involved the extremity of a long bone, such as the femur or tibia, amputation has been regarded as the treatment of choice.

X-radiation.—X-radiation therapy first results in an apparent extension of the tumour (*Plate XXVIII, Fig. F*). Further radiographs 1 to 3 months after

PLATE XXVII

OSTEOCLASTOMA

(JAMES F. BRAILSFORD)



Fig. A.—Osteoclastoma of lower end of radius prior to curetting.



Fig. B.—Same case as *Fig. A*, 9 months after curetting.



Fig. C.—Six years after curetting of osteoclastoma from lower end of femur—un-united fracture.



Fig. D.—Four years after curetting of osteoclastoma from lower end of tibia. Note obliquity of articular surface of ankle-joint.

PLATE XXVIII

OSTEOCLASTOMA—continued

(JAMES F. BRAILSFORD)



Fig. E.—Typical osteoclastoma of lower end of radius, June 3, 1942.



Fig. F.—Same lesion on June 29, after X-radiation therapy.



Fig. H.—Same lesion on Dec. 17. Progressing re-ossification. At his usual employment. December, 1943: The patient has recovered full function.



Fig. G.—Same lesion on July 26. Note apparent extension of tumour and increased osteolysis with fracture of thinned bony wall.

PLATE XXIX

OSTEOCLASTOMA. ATYPICAL PNEUMONIA

(JAMES F. BRAILSFORD)

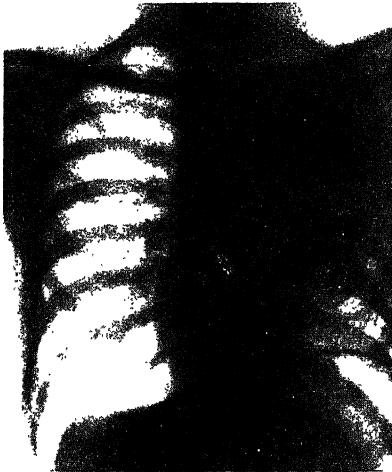


Fig. A.—Secondary in chest Sept. 7, 1942, from osteoclastoma in head of tibia. Limb amputated in August, 1942.

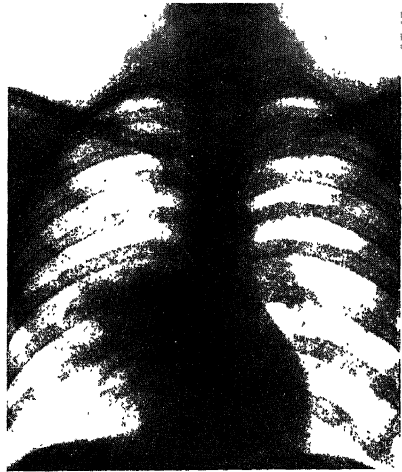


Fig. B.—Atypical pneumonia. Note increased shadows in right hilum and outlining of vena azygos lobe. The lesion cleared within 10 days and the radiograph at this time was of a normal chest.



Fig. C.—Atypical pneumonia in man aged 30, March 25, 1941. Appearances resemble those of pulmonary tuberculosis.



Fig. D.—Same patient as *Fig. C*, April 19. Note that lesion has mostly resolved. A month later the chest appeared to be normal.

administration of the radiation therapy will show marked increase in the area of osteolysis (*Plate XXVIII, Fig. G*). Clinically the tumour site becomes much expanded, the skin usually becomes red, glossy, and tight, suggesting increased activity of the tumour. These clinical and radiographic features have been regarded as evidence of the activation of tumour cells by radiation and been the cause of many amputations. I was unable to prevent it in a case from which I secured the specimen and had careful histological preparations made. No sign of the typical tumour cells could then be detected; instead degenerate tissue which defied correct interpretation was present. If patience is shown and the case watched for a further period of one or two months the prominent clinical signs will gradually fade and radiographs will show a progressive re-ossification of the tumour site (*Plate XXVIII, Fig. H*). Restoration to normal function may be expected in some sites within the time taken for the consolidation of a fracture. With a large area of destruction the time will be correspondingly increased. The added osteolysis resulting from the radiation must be appreciated and the limb immobilized until evidence of re-ossification is obtained, or fracture may result (*Plate XXVIII, Fig. G*). Even in those cases in which amputation appears to be the only possible way of preventing invalidism radiation therapy may lead to consolidation and salvation of the limb.

It may be urged that biopsy is essential because the radiograph is not infallible. The answer is that its infallibility is largely a measure of the extent of the knowledge of radiographic appearances, but in any case it does not seriously matter. There is no simple lesion which produces this radiographic appearance which will be improved by biopsy, and there is no malignant lesion which will not be the better for the radiation, even if amputation later appears to be desirable. Further, the histological interpretation is by no means infallible. The tumours found in the bones in hyperparathyroidism have sometimes identical histological characters, but these respond to enucleation of the parathyroid tumour, and have radiographic characters which are entirely distinct. Certain tumours, like that recorded by Matthew Stewart, are throughout white and solid in consistency, quite different to the prune-juice colour of the typical osteoclastoma, have identical histological characters, but cause death by metastases. For these reasons I advise that the best treatment for osteoclastoma is X-radiation therapy and no biopsy, warning the surgeon to expect the clinical and radiographic evidence of apparent extension of the growth and the possibility of pathological fracture during the first 3 months.

J. Gershon Cohen² records that the late results of roentgen irradiation of giant-cell tumours are good: the percentage of cures with irradiation alone is possibly more than 85 per cent. There is apparently less morbidity and better recalcification of the tumour after irradiation than after surgery. The complications of recurrence and infection following surgery are avoided.

Traumatic Lipo-hæmarthrosis of the Knee.—Bengt. S. Holmgren,³ and later C. B. Peirce and D. C. Eaglesham,⁴ publish radiographs showing fluid levels of different density in the knee-joint following injury when the lateral radiographs are taken with the tube directed horizontally towards the knee-joint, with the patient supine. They consider that the injury results in freeing fat from the bone-marrow and perhaps in the rupture of the fascial boundaries of the fat and that the latter passes into the joint. Here it floats on the denser effusion or blood produced by the injury to give the horizontal levels shown on the radiograph.

Osteogenesis Imperfecta.—The reviewer⁵ shows that ossification of the foetus even at full term may be so defective that the radiograph of the pregnant mother shows little or no evidence of a foetal skeleton and may lead to the erroneous diagnosis of an ovarian cyst. The characteristic features of this dystrophy are,

in the infantile form, the failure for most of the ossification to pass beyond the stage of calcification and the presence of innumerable fractures ; in the infant, multiple fractures, flattened vertebral bodies, expanded extremities of the tubular bones with a relative hypoplasia of the shafts, and tendency to ballooning of a thin skull ; towards puberty, marked irregularity in growth in the metaphysal borders of the epiphyses and expanded ends of the diaphyses, suggesting proliferation of cartilage, osteoid, or other pre-osseous tissue instead of bone ; in the adolescent and adult, localized thinning and bulging of the skull, marked deformities of the ribs and pelvis ; slender shafts of the tubular bones of the lower extremity, composed chiefly of compact tissue with extremities which are expanded to almost normal size, but made up of an open cancellous structure which makes them relatively radio-transparent. Marked bending of the pelvis and of the bones of the lower extremity indicate an unusual degree of plasticity.

Solitary Fracture of the First Rib.—S. E. Sjögren⁶ points out that these lesions are often missed on the usual A.P. radiograph and urges the need for tangential views. About two-thirds of the fractures are due to trauma, but some appear to be due to indirect violence such as powerful and unco-ordinated muscle-pull. Because of the close relationship between the first rib, the brachial plexus, and the subclavian vessels serious or even fatal complications of the fracture can occur.

CENTRAL NERVOUS SYSTEM

Brain Tumour: Localization.—Vincent C. Johnson and Fred J. Hodges⁷ have analysed 10-year records of 565 patients. The tumours were classified as : encephalic tumours, 361 (63.9 per cent) ; tumours of covering cells, 124 (22 per cent) ; hypophyseal tumours, 51 (9 per cent) ; dysembryomas, 21 (3.7 per cent) ; vascular tumours, 8 (1.4 per cent). Routine examination of the skull was done in 527 cases, with 24 per cent accuracy in localization. Encephalography done in 48 cases gave an accuracy of 68.8 per cent, while ventriculography, which was done in 282 cases, gave an accuracy of 92.2 per cent. With the 51 hypophyseal tumours the routine examination was accurate in 80 per cent.

Air Myelography of Cervical Canal Lesions.—Robert M. Lowman and A. Finkelstein⁸ reviewed the encephalography of 50 patients and found that air could be demonstrated in all of them ; it visualized the canal. Lipiodol is unsatisfactory because of the position of the patient, the fragmentation of the lipiodol, and its escape into the cranium. They discuss the normal anatomical appearances and the changes which are produced by tumour, syringomyelia, etc.

The Sella Turcica.—H. Burrows, A. J. E. Cave, and Kathleen Parbury⁹ have examined and measured the pituitary fossa in the medial sagittal plane and analysed their findings. Racial and sexual differences were noted. Both in the white and the negroes the male fossa is larger than the female, and for the corresponding sexes the fossa is larger in the European than in the African.

Calcification and Ossification of Spinal Tumours.—E. D. Gray¹⁰ points out that direct visualization of a spinal tumour on the plain radiograph is not often possible and is in fact not to be commonly expected. With an improvement in the technique a larger number of tumours will be recognized by this means.

RESPIRATORY TRACT

Atypical Virus Pneumonia.—Paul V. McCarthy¹¹ points out that many of the patients are not extremely ill, have minimal physical and radiographic signs, and rapidly recover. Those who are more severely affected usually have a dry unproductive cough with a feeling of chilliness rather than rigors, fever, and general malaise. Other symptoms are severe headache of distressing proportions, which is present in a large number of cases ; dizziness, drowsiness,

and slight mental confusion: temperature varying from 100° to 103° or even 105°; a relatively slight brachycardia; and a respiratory note which is low except in severe cases. The physical signs appear to lag behind the radiograph.

The radiographic findings have been grouped as follows: (1) Hilar enlargement with increased prominence of linear markings: later there is development of parenchymal density (less than in lobar pneumonia) with striæ visible through it (*Plate XXIX, Fig. B*). (2) Patchy involvement of a single lobe suggesting a bronchopneumonia—this type appears to resolve readily. (3) Infiltration radiating from the hilar regions and closely simulating pulmonary tuberculosis (*Plate XXIX, Figs. C, D*). (4) Extensive lung markings with multiple small lesions as in milary tuberculosis. The lesions in one lobe may appear to resolve while others appear to develop in different lobes.

Lung Abscess Secondary to Aseptic Pulmonary Infarction.—This has been regarded by some authorities as a rare phenomenon, but Edward M. Chester and George R. Krause¹² find that it is not uncommon. The onset is usually heralded by hæmoptysis accompanied by pain in the chest and later a moderate elevation in the temperature and leucocyte count. Signs of consolidation and a pleural friction rub may be detected. After an interval of some days or weeks, often when the patient is apparently improving, the sputum increases in amount and becomes foul, a secondary rise of temperature and leucocyte count occurs, and an abscess can be demonstrated on the cardiograph. A pulmono-pleural fistula may result.

(See also article LUNG, ABSCESS OF.)

Diseases of the Mediastinum and Associated Conditions.—Lester W. Paul¹³ has given a good account of the anatomy and radiographic appearances of the normal and of the lesions which can be detected by radiography.

Pulmonary Lesions associated with Cystic Fibrosis of the Pancreas.—This is a clinical entity affecting infants and young children which is not very uncommon. The condition appears to commence when the infant is about 2 months old; it steadily progresses until death, which takes place about 6 months after. It shows a definite familial tendency and appears to be associated with a common congenital anomaly of the lungs and pancreas: the term congenital familial steatorrhoea with fibrosis of the pancreas and bronchiectasis has been suggested. Anderson has stated that the best available proof of the diagnosis is the absence of pancreatic trypsin and lipase in the duodenal juice. The radiographic appearance of the lungs should suggest the diagnosis and lead to an investigation of the duodenal juice. The radiographic appearances of the lungs are produced by purulent bronchitis with bronchiectasis and abscess formation with surrounding pneumonitis. These produce marked bilateral hilar opacities with definite increased striation, radiation into the lungs, and in some cases areas of atelectasis or emphysema which give the suggestion of chronic rather than acute lesions and may be mistaken for those of tuberculosis. A good account of the condition is given by C. J. Attwood and W. H. Sargent.¹⁴

Mass Radiography of the Chest.—It is now being frankly admitted by the advocates for the Government scheme that miniature photography of the screen image is inferior to direct radiography. P. Kerley¹⁵ states: "Practically all workers, both here and abroad, have stressed the fact that the miniature does not compare in detail with the full-sized radiograph; hence the method is restricted to sifting cases of comparatively gross disease". Surely the adoption of such a scheme, which employs a primary sieve so defective, yet on the positive results only of which any clinical investigation is made, overlooks the essential feature—i.e., *tuberculosis is an infectious disease*. To examine small selected groups over a long period (and this is all that can be done with the very limited number of radiographic units to be made available—perhaps as many as 30),

with the number of staffs capable of doing the work, and necessarily neglect the multitudinous possible contacts with disease at home, on holiday, in the club, school, workshop, or other place of gathering, will give no guarantee that even those which appeared to be free from the disease at the time of the examination had not contracted it the week or so after : though it may give a false sense of security which might very well be the cause of a delayed investigation and diagnosis.

In a report on the analysis of 53,400 X-ray films of men in the Army of the U.S.A., Esmond R. Long and William H. Stearns¹⁶ state : " This review would indicate that a certain number of active cases have slipped through. A certain number could easily be missed unless one inspected the 4 x 5 inch films singly as well as stereoscopically. More difficult to explain is the overlooking of several cases of moderately and far advanced disease. It has been discovered that clerical errors were responsible for the induction of some of these men ". In the report of the discussion which followed, Colonel de Lorimer¹⁶ stated that " on the average each mistake cost the taxpayers \$10,000 to \$15,000. Moreover in many instances there was dissemination of disease by the individuals involved resulting in a multiplication of the compensation requirements. Surely these studies indicate the great responsibility which rests upon the doctors who are entrusted with this work ".

E. C. Ernst¹⁶ said : Let us not be unmindful of the mental anguish and economic stigma which must certainly follow many of these rejected applicants throughout their lifetime ". He stated : " In a group of 24 men observed during the past month and previously examined by me 3 to 5 years prior to the present examination, all of whom were rejected by Army Boards as tuberculous suspects, not a single one presented suspicious history findings and even now they show no evidence of clinical tuberculosis ".

As far as tuberculosis in children goes, J. A. Myers,¹⁷ who based his conclusions on the examination of no less than 16,824 children, has stated that the taking of X-ray films of the chests of children is almost a total waste of time. Contrasted with radiology the skin reaction in children detects the active rather than the remote infection, and, as J. E. Jones Davies¹⁸ states in his report : " It is not nearly so significant to determine how many children have been infected in the past as it is to learn how many harbour virulent tubercle bacilli ". A careful survey of the details of the cases he cites will in itself indicate the futility of any mass radiography, no matter how good, when it is divorced from the ordinary public health investigations.

It has been said that mass radiography will pick up the infectious patient who has not been diagnosed, and the impression is given either that there are many people who are suffering from progressive pulmonary tuberculosis without knowing it, or that the general practitioner has failed to diagnose it or seek the help of the tuberculosis officer. Surely, except in certain rare cases, both these impressions are wrong. The disease in the susceptible patient, like most diseases, has an onset and a progression which cannot fail to attract the attention of the patient or those about him. If he seeks the advice of his doctor and the latter fails to appreciate that the condition is something more than his being generally run down, or that maybe he is suffering from a persistent bronchitis following a cold or the 'flu', it is perhaps not surprising, for so often have these signs caused him to cry " Wolf ; Wolf ; ", only to be assured by the tuberculosis officer, consulting physician, or radiologist that nothing could be detected by X rays. As I have shown in a previous criticism, it is only a small proportion of such referred patients who show radiographic evidence of pulmonary tuberculosis. In some cases, though repeated references have met with negative findings, ultimately the disease has manifested itself : a lesson not likely to be overlooked

by the practitioner, who, in spite of the multiple negative reports, should be encouraged to send his suspicious cases for investigation.

R. R. Trail¹⁹ has published a paper in support of the scheme, and in the same journal a further criticism by the reviewer²⁰ will be found.

(See also article MASS RADIOGRAPHY OF THE CHEST.)

MISCELLANEOUS

Pancreatic Tumours.—The radiograph does not show any sign of the normal pancreas, and in making examinations of the abdomen the possibility of lesions in this organ are frequently overlooked though we may have direct and indirect evidence of their presence. The tumour (and stones in the duct) may be identified from the plain radiograph. It may cause erosion of one or more of the upper three lumbar vertebral bodies, particularly on the left side when it comes into closer association. It may lead to scoliosis, elevation and restriction of the left diaphragm, parallel with the upper borders of which an opacity may develop in association with a tumour of the tail. The simple cysts produce pressure signs on adjacent viscera of greater extent than is usual with the malignant growth, though one does see occasionally massive neoplasms.

As the duodenum forms a C-shaped boundary to the head of the pancreas, when a cyst develops within it the barium-filled duodenum is seen to be represented by a considerably larger C; its mucous folds may in places be shown in relief; it may even show evidence of localized obstruction; the pylorus and prepyloric area of the stomach may be elevated, sometimes occluded, or the pattern of the mucous folds emphasized. The gall-bladder shadow is enlarged and may not diminish after a fatty meal. Lesions of the body of the pancreas may produce a pressure deformity of the stomach or elevate it or push it forwards or to the left. The forward displacement of the stomach as seen during screening in the lateral position is a very variable observation. When the lesion is in the tail of the pancreas the stomach may be pushed medially or forwards. The transverse colon or splenic flexure may be pushed downwards, and they may exhibit pressure deformities. Malignant tumours of the pancreas tend to fix the structures—secondaries may produce signs before the primary is suspected.

J. Borak²⁰ discusses the differential diagnosis, and illustrates the radiographic features produced by pancreatic tumours and cysts.

Cystic fibrosis of the pancreas with associated pulmonary lesions is referred to in a previous paragraph.

Idiopathic Steatorrhœa.—In this condition the mucosal pattern of the small intestine shows a marked change from the normal (*Plates XXX, XXXI*). The reviewer²¹ has published an illustrated record of these changes. Somewhat similar deficiency patterns accompany other conditions.

Hookworm Disease.—George R. Krause and James A. Crilly²² have described and illustrated the changes in the pattern in this disease.

Pelviccephalometry.—Robert P. Ball and Ross Golden²³ consider that the erect position has definite advantages in pelviccephalometry, for gravity does not change the position of the uterus when the patient turns from the antero-posterior to the lateral positions, as it does when she is horizontal; and hence true right-angle views of the foetal head are obtained. They describe a simple measure of mensuration of the maternal pelvis and foetal head. The procedure, as in all other radiographic methods, more frequently shows the obstetrician that engagement and delivery can probably occur than aids him positively in deciding on elective Cæsarean section.

Fœtal Disproportion.—E. R. Williams²⁴ has written a review of the evidence on the radiological diagnosis of disproportion which will repay careful study.

REFERENCES.—¹*Lancet*, 1943, 1, 776; ²*Radiology*, 1943, Sept., 261; ³*Acta radiol.* 1942, 23, 181; ⁴*Radiology*, 1942, Dec., 655; ⁵*Brit. J. Radiol.* 1943, May, 129; ⁶*Acta radiol.* 1942, 23, 79; ⁷*Radiology*, 1943, Aug., 116; ⁸*Ibid.* 1942, Dec., 701; ⁹*Brit. J. Radiol.* 1943, March, 87; ¹⁰*Ibid.* 1942, Dec., 365; ¹¹*Radiology*, 1943, April, 344, and editorial; ¹²*Ibid.* 1942, Dec., 647; ¹³*Ibid.* 1943, Jan., 10; ¹⁴*Ibid.* 1942, Oct., 417; ¹⁵*Brit. J. Radiol.* 1942, Dec., 346; ¹⁶*Radiology*, 1943, Aug., 144; ¹⁷"Detection of Tuberculous Infection," *J. Amer. med. Ass.* 1939, 112, 1904; ¹⁸*A Study of the Incidence of Epidemiology of Tuberculous Infection in Elementary School Population of the County of Radnor*, Publ. Hlth. Dep., Llandrindod Wells; ¹⁹*Publ. Hlth.* 1943, 56, July, No. 10; ²⁰*Radiology*, 1943, Aug., 170; ²¹*Brit. J. Radiol.* 1943, Sept., 283; ²²*Amer. J. Roentgenol.* 1943, June, 719; ²³*Ibid.* 731; ²⁴*Brit. J. Radiol.* 1943, June, 173; ²⁵*The Radiology of Bones and Joints*, 1944, Churchill.

RADIOTHERAPY.

Ralston Paterson, M.D., F.R.C.S.E., F.F.R.
M. C. Tod, F.R.C.S.E., F.F.R.

ORGANIZATION

Radiotherapy has continued to advance during 1943 both by improving recognized methods of treatment and by extending the experimental study of new forms of radiation. The improved methods of treatment are the result of much hard-won experience, while the new work requires extremely powerful and expensive apparatus. Careful and far-sighted organization is needed if both are to be used to the best advantage.

This has been recognized by the Faculty of Radiologists, whose Council has drawn up and circulated recommendations for the planning and organization of radiotherapy centres in Great Britain.¹ The idea of such centres is not new, but it is of special interest that the representative body of radiologists has agreed to recommend the fusion of the many small centres now in existence to form large centres. Arguments in favour of such fusion are: (1) Adequate quantities of radium and different types of X-ray plant would be available under a single direction; (2) A team of radiotherapists would work together, thus avoiding the narrow outlook which is liable to result when work is done in isolation; (3) The centre would be planned as part of a research institute, preferably one housing apparatus for the production of experimental radiations. The basis of these plans is the unit of population, placed at one million, estimated to yield a minimum of 600 new cases of cancer requiring radiotherapy each year.

The provision of reliable radiotherapy for cancer is not, however, the whole problem. There are conditions other than malignant for which radiotherapy is required, notably certain diseases of the skin and many inflammatory conditions, the treatment of which has now been placed on a scientific basis. If the treatment of malignant disease is segregated to large centres, some arrangement must be made for the provision of suitable apparatus and experienced radiologists to treat these other conditions. These questions are still matters for discussion and no definite plan has yet been put forward, but it seems clear that some form of co-operation between the dermatologist and radiologist will be necessary to ensure that the patient gets the best possible form of treatment. The treatment of infections requires more experimental investigation, but the principle of low-dosage therapy for these conditions is becoming established. This method does not require high-voltage plants and, provided calibration is accurate, it seems that this form of therapy might be made available in hospitals other than radiotherapy centres. The value of such work would be much enhanced if directed and co-ordinated by a competent radiotherapist, preferably a member of the staff of a centre.

BENIGN CONDITIONS

Infections.—Last year there were already a number of papers drawing attention to the value of this low-dosage therapy of infections. These have been added to and the knowledge of the method of action is more exact. N. S. Finzi and

PLATE XXX

IDIOPATHIC STEATORRHOEA

(JAMES F. BRAILSFORD)

Fig. 2. 15 mins AFTER MEAL

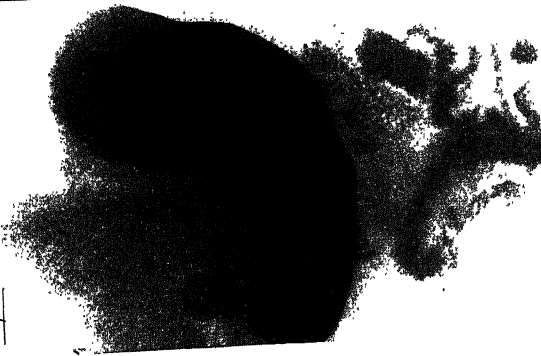


Fig. 3

30 mins AFTER MEAL



Fig. 4. 1 hr AFTER MEAL



Fig. 4.—Fifteen minutes after meal. Note regularity of flow of barium in jejunal coils at this stage.

Fig. B.—Thirty minutes after meal. Note that barium content is now broken up into irregular clumps in somewhat dilated coils of jejunum.

Fig. C.—One hour after meal. Note dilated coils of jejunum, some with irregular serration of periphery.

Plates XXX, XXXI by kind permission of the 'British Journal of Radiology'

PLATE XXXI

IDIOPATHIC STEATORRHŒA—continued

(JAMES F. BRALLSTROM)



Fig. 5.

1 1/2 hrs after meal



Fig. 6.

2 hrs after meal

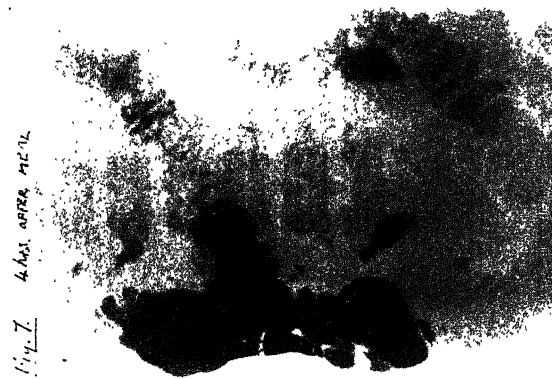


Fig. 7.

4 hrs after meal

Fig. 5.—One-and-a-half hours after meal. Note some of the barium had reached the pelvic colon; the coils of jejunum and ileum are irregularly dilated and filled.

Fig. 6.—Two hours after meal. The disposition of the barium is still irregular.

Fig. 7.—Four hours after meal. Within the last two hours the stomach and small intestine had almost emptied.

PLATE XXXII

THE CYCLOTRON: A NUCLEAR TRANSFORMER

(P. C. AEBERSOLD)

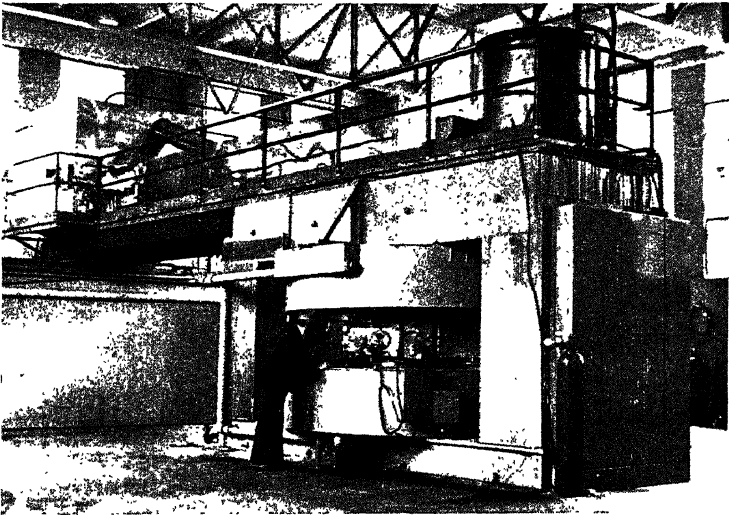


Fig. A.—View of the 60-inch cyclotron from the bombardment chamber side. The bombardment chamber is seen at the edge of the Dee chamber between the coils of the magnet. The radiofrequency oscillators for supplying power to the Dees are in the metal house at the left above the cyclotron, while the D.C. voltage supply for the deflector is in the tank above at the right.

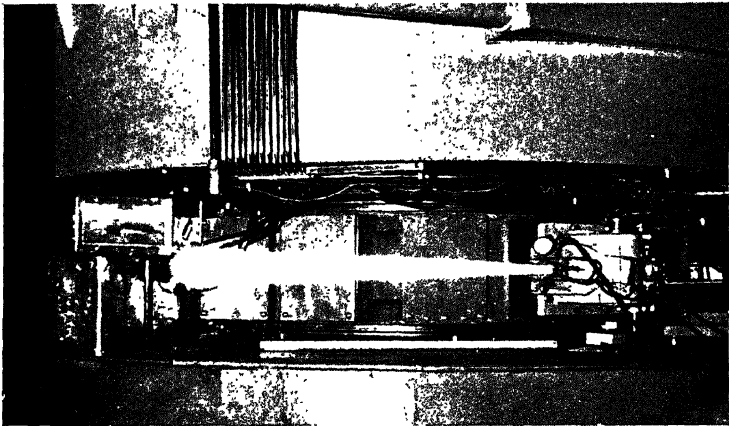


Fig. B.—A close-up view between the magnet coil tanks of the 60-inch cyclotron, showing the approximately 5-foot-long glow produced in the air when a 16-Mev beam of deuterons is let out of the target chamber on the right. A thin aluminium foil, through which the deuterons easily penetrate and yet which will maintain a vacuum in the chamber, is used in place of an ordinary thick target. The beam flares at the end of its travel because when the deuterons slow down they scatter more easily and ionize more heavily.

PLATE XXXIII
RADIUM TREATMENT OF CANCER OF THE MOUTH
(J. R. NUTTALL)

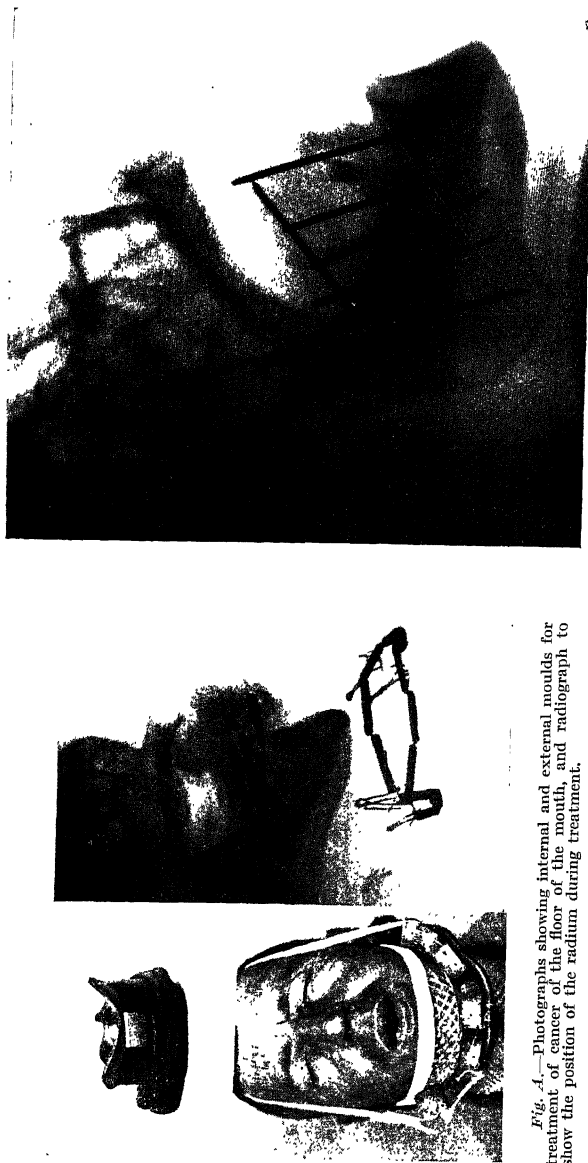


Fig. A.—Photographs showing internal and external moulds for treatment of cancer of the floor of the mouth, and radiograph to show the position of the radium during treatment.

Fig. B.—Single-plane implantation of the side of the tongue to show accurate placing of needles to secure homogeneous dosage.

F. Freund² discuss the use of X rays and radium in the treatment of wounds and inflammations. They consider that this method has been much neglected, and describe a series of experiments undertaken by Dr. Freund to demonstrate the effect of irradiating healing wounds in the skin and cornea, and fractures of the fibula in rabbits. They conclude that small doses of X rays accelerate healing but larger doses have the opposite effect, and that low-dose irradiation should be used in all cases in which healing is delayed, in chronic ulcerative lesions, and in fractures where bony union fails to occur. They also report that post-herpetic and trigeminal neuralgias are improved by this form of therapy. Dosage to the lesion varies between 30 r and 80 r. Doses below 50 r are given twice weekly, above 50 r once weekly. Doses of 150 r are too high and may be followed by bad results.

On the experimental side, F. J. Rigos³ tested the effects of irradiation in acute peritonitis on the cells of normal peritoneal fluid in the guinea-pig. It was found that the most certain way of producing peritonitis was by injecting broth cultures of *Escherichia coli* intraperitoneally. Seven groups of eight animals were used. The intraperitoneal injection was given, and 2 hours later an X-ray exposure of 40 r to 50 r measured in air; finally 6 hours after injection a second exposure of 85 r to 100 r. In the controls, 42.9 per cent died of peritonitis; in the treated animals, 28.6 per cent; a decrease of 14.3 per cent.

A further series of experiments tried to determine the effect of irradiation on the normal cellular response to tissue irritants, and certain conclusions were drawn. Doses of X rays of less than 100 r have little effect on the cell-counts of the peritoneal fluid of guinea-pigs but do cause a relative increase in the percentage of macrophages and lymphocytes; 100 r increases the total cell-count; 200 r causes a decrease of the cell-count but a relative increase of the percentage of macrophages. The doses are mildly destructive and irritant and doses between 50 r and 100 r are more irritant than destructive. Such doses seem to have a definite value in the treatment of peritonitis in the guinea-pig.

Another condition for which radiotherapy is recommended is *virus pneumonia*, a condition to which attention has recently been directed. A. Oppenheimer⁴ reports 56 cases of virus pneumonia treated by X-radiation. At first a dose of 100 r was tried, but the reactions were too severe. Further trial showed that doses ranging from 35 r in early cases, to 90 r in cases seen at a later stage, caused the disappearance of fever and symptoms. In the early cases one exposure might be enough, but when treatment had not begun at once several treatments at intervals of two or three days might be needed.

The value of X rays in *gas gangrene* infection remains less certain. E. Singer⁵ carried out a number of experiments on mice using infecting doses of 0.01 c.c. of *Clostridium Welchii*, or 0.15 c.c. of *Vibrio septique* cultures, and treated with X-ray doses of 50 r or 100 r, sulphanilamide, and antitoxic serum, and came to the conclusion that neither the mice infected with culture alone, nor the ones injected with a mixture of culture and sulphanilamide, benefited by X-ray treatment. In spite of these negative findings, it remains possible that in the early stage of infection, before it becomes generalized, X-ray therapy may be helpful.

Although the number of papers published during the year on the subject of the treatment of inflammatory conditions by radiation is small, there is no doubt that this method calls for serious consideration. In the past great claims were made which were difficult to substantiate, partly because there was little agreement regarding technique. It is now generally accepted that dosage must be very low, varying from 50 r to 100 r but not exceeding the latter figure. The action of X rays is always destructive, and the idea that stimulating doses of radiation produced increased activity of certain cells has been given up, but in

this case it appears that the destruction of a small number of highly susceptible cells, such as polymorphonuclear leucocytes, by the small dose of radiation results in the attraction of increasing numbers of those cells concerned in the defensive mechanism of the reticulo-endothelial system. It follows that both acute and chronic infections may benefit by this mild stimulus to the natural process of defence and repair and that it should be given a more extensive trial.

It might be thought that chemotherapy had so greatly reduced the dangers of acute infection that there was no need for other methods of treatment, but there still remain cases which fail to respond and it is worth trying anything which may improve the chance of recovery.

If X rays are to be used in the treatment of acute infections they must be taken to the patient, at least to the extent of providing this therapy under the same roof. Mobile X-ray plant capable of producing radiations of a wavelength for treating such conditions as pneumonia and peritonitis, say 140 kv., may some day be regarded as essential equipment for any hospital responsible for large numbers of acute cases. Chronic infections respond slowly and their treatment must be prolonged. It may be many weeks before any improvement can be seen, and both faith and patience are needed if the best results are to be obtained. Among the conditions which may be expected to benefit from low-dose X-ray therapy are: tuberculosis in lymph-nodes and breast,⁶ actinomycosis, chronic osteomyelitis, sinusitis,⁷ and otitis media.⁸

G. Hilton⁹ records the treatment of 62 cases of *ankylosing spondylitis* by X-radiation. Of these 7 were apparently well and were leading normal lives; 38 were much improved, free of continuous pain, and most of them able to work; 15 were too recently treated for assessment; only 2 were not improved.

MALIGNANT DISEASE

New Forms of Radiation.—The great technical advances of the last few years—the cyclotron, the betatron, and the use of radio-active salts for physiological investigation—are almost entirely due to the astonishing achievements of American scientists. Although they have been invented and constructed by physicists and engineers, one of the underlying motives has been the desire to improve the method of treating cancer. P. C. Aebersold¹⁰ describes the giant *cyclotron*, or nuclear transformer, which is under construction at the University of California for experimental purposes. First a cyclotron was built which gave a beam of deuterons with 8 Mev of energy, then in 1939 a larger type which gave a beam of deuterons with 16 Mev of energy (*Plate XXXII*), and it is by utilizing these beams that it has been possible to attempt treatment of cancer with fast neutrons. This pioneer work is described by R. S. Stone and J. C. Larkin¹¹, whose first problem was the establishment of a unit of measurement for a radiation with physical properties which differ from those of X rays. The intensity of the neutron beam can be measured by a Victoreen condenser type of r meter, and for working purposes the amount of neutron radiation which gave a scale reading of 1r on the Victoreen was called 1n. Biologically 1n so measured seemed approximately equivalent to between 5r and 7r X rays. The reactions to divided doses were for instance investigated, and it was found that a dose of 1000n, spread over 30 to 35 days on an open field 10×10 cm., produced moist desquamation equivalent to what one might expect from about 6500r in the same time. They treated 120 cases, and the sites included tongue and floor of mouth, pharynx and larynx, breast, prostate, and stomach. The method of exposure was similar to that used for subvoltage therapy. Of the 120 cases complete regression was obtained in 26, partial in 53. The statistics of survival are disappointing, but all the cases treated suffered from very advanced cancer, and, as is inevitable when an experimental technique is first tried, some developed

excessive reactions. It has, however, been established that cancer can be favourably influenced by exposure to the neutron beam and that normal tissues can recover from specific exposures.

The *betatron* is described by D. W. Kerst¹². It is an apparatus in which energy is transferred to electrons by the accelerating effect of a time-varying magnetic field. The beam thus consists of electrons instead of the neutrons of the cyclotron beam. A 30 million volt betatron has been constructed at the University of Illinois, and a 100 million volt apparatus has been designed for research. It is believed that a betatron operating at 20 to 30 million volts will be useful for therapy. H. W. Koch, D. W. Kerst, and P. Morrison¹³ have investigated the depth doses for 5, 10, 15, and 20 million volt X rays, produced by directing the electron beam of the betatron on to a target. It is necessary to use a target because the direct electron beam has not yet been sufficiently collimated and controlled, but suitable intensities for therapy are obtained with the X rays produced. The same question is discussed by J. G. Trump and R. W. Cloud,¹⁴ together with R. Dresser,¹⁵ who have been working with 3000 kv. and describe the effects of this irradiation on patients. Treatment produced some marked reactions in the deeper tissues where two or more beams crossed, with no sign of erythema or epilation of the overlying skin. An editorial in the *American Journal of Roentgenology*¹⁶ discusses these papers and points out that if the incident dose is taken as 100 per cent, the maximum dose varies from 125 per cent at 1 cm. below the surface for 5000 kv. to 230 per cent at 3 cm. below the surface for 20,000 kv. Both the potential benefits and the potential dangers of therapy at such voltages call for the most careful experimental investigation and the excellent summary given indicates the lines which should be followed.

The increasing ease with which very high energies can be obtained has provided a variety of artificially produced radio-active substances. These have already been extensively used as physiological tracers, but are also being used for therapy. A good summary of the work is given by F. J. Hodges¹⁷ in his Crane Lecture on "The Cyclotron as a Medical Instrument". B. V. A. Low-Beer, J. H. Lawrence, and R. S. Stone¹⁸ discuss the methods of administration and possible effects of radio-phosphorus, radio-strontium, and radio-iodine. The radio-active chemical enters into metabolic processes in the same way as the normal substance, and therefore may either disseminate throughout the body, or may be selectively deposited in certain organs, e.g., iodine in the thyroid gland. Injections are given once or twice weekly and the technique is exceedingly simple. Promising results have been obtained with radio-phosphorus in leukemia. In lymphosarcoma the immediate response is good but it is too early to evaluate results, and the same applies to Hodgkin's disease. The other radio-active substances are still on trial.

J. G. Hamilton¹⁹ adds polycythemia to the list of diseases treated with radio-phosphorus. He believes that radio-active iodine and possibly its homologue, element 85, will be used in the treatment of hyperthyroidism. It is not likely to be so useful in cancer of the thyroid because the neoplastic gland does not accumulate iodine. A warning is given against the indiscriminate use of this dangerous substance in non-malignant disease. Radio-calcium, although deposited in bone, is not suitable for therapeutic use, but radio-strontium is more likely to offer some help in the treatment of bone tumours.

Radium Therapy.—Although experimental radiations hold promise, the standard method of treating many malignant conditions, and that which has produced the best results, is radium therapy. Writing on the present status of radium therapy, D. Quick²⁰ says that radium has some peculiar advantages to offer and is also a useful complement to surgery or X-ray therapy. It can be used by external, intracavitary, and interstitial application, and one or other

of these methods is most effective in the treatment of carcinoma of the mouth, pharynx, bladder, prostate, uterus, and some breast tumours.

Intra-oral treatment of cancer of the mouth is described by J. R. Nuttall.²¹ A high proportion of malignant tumours in the mouth are squamous carcinomas, so there is a degree of sensitivity which only leaves a small margin of safety between the tumour lethal dose and that which produces necrosis of normal tissues. Accuracy in planning and carrying out treatment is thus of paramount importance. Two methods of intra-oral treatment are described: moulds carrying radium and implantation of radium needles or radon seeds. The method of choice for each region—tongue, fauces, etc.—is listed, with full details of the construction of moulds and the calculation of dosage for various types. The technique of radium implantation is also given in detail and illustrated with X-ray photographs of actual implants (*Plate XXXIII*). The nursing of patients during treatment and reactions following their treatment also receive attention. The results found by the follow-up of patients treated by these methods show their value: 28 per cent of a group of 442 patients suffering from cancer of the mouth in all stages survived 5 years. Of 140 cases remaining gland free (i.e., without developing secondaries in lymph-nodes), 65 per cent lived for 5 years.

Cancer of the uterus, both cervix and corpus, is still mainly treated by radium, although many clinics add X-ray therapy. H. H. Bowing and R. E. Fricke²² believe that in cancer of the cervix, the individual treatment of each patient is necessary. The most important part of the treatment is the arrangement of the radium with the patient in the knee-chest position, so that very accurate placing is possible. The stage of the disease is the essential factor in determining results, pathological grading having little importance. The cure-rate for 796 cases treated and traced was 34.2 per cent. The question of dosage distribution in the treatment of cancer of the cervix has been the subject of several papers. J. F. Noland and E. H. Quimby²³ have studied the fields of radiation from several arrangements of intracavitary and interstitial radium. They have found the doses delivered at various points in the parametria, rectal and vaginal mucosa, and bladder, and from these make certain suggestions regarding the methods most likely to give the highest efficiency while sparing important neighbouring organs. G. J. Neary²⁴ has made a similar study for intracavitary radium. He suggests that under certain conditions a single central source of radium may be better than two in the vagina, and proposes improvements in the distribution of the radium in the applicators with a platinum screen to save the rectum. B. Sandler²⁵ discusses the planning of combined radiotherapy of carcinoma cervicis uteri. The dimensions of the vagina are very variable and the tumour often produces distortion, thus the isodose surface may be very different from the theoretical shape of the ideal radium application. The object of adding X-ray therapy is to reach those sites not adequately treated by radium. To do this fields must be carefully planned, techniques must be varied for the individual case, and beam direction must be used. Very simple methods can be successful, particularly in cancer of the corpus uteri. R. E. Fricke and H. H. Bowing²⁶ used a tandem containing 100 mg. of radium and extending the whole length of the uterus; 106 cases were treated, 83 of them because there was a condition, such as obesity or cardiac disease, contra-indicating surgery: 66 were completely treated and 47 per cent lived five years; 40 were palliatively treated and 28 per cent lived five years. If the clinical staging is followed, the survival-rate for stages 1 and 2 was 66 per cent; for 3 and 4, 20 per cent.

Cancer of the larynx can be treated either by radium or by X-ray therapy. C. Wood²⁷ describes the technique of telerradium treatment. Very small ports of entry must be used for treatment by means of the radium beam, and accurate

methods of beam direction are required. If the ports are correctly arranged, the delivery of dosage can be accurately controlled and a good response may be expected. B. W. Windeyer²⁸ discussed the different types of X-ray and radium treatment which were suitable for different kinds of growth in the pharynx and larynx, and Ralston Paterson²⁹ mentioned the local forms of radium treatment which were useful, particularly the Finzi-Harmer fenestration technique for suitable cases and a similar method which replaced the radium by contact X-ray therapy to the window in the cartilage while it was exposed by operation, and had a rather wider range of usefulness. M. Lederman and W. V. Mayneord³⁰ write on the technique of radium treatment of intrinsic cancer of the larynx with special attention to teleradium or radium beam therapy. Treatment must be planned for the individual patient and steps taken to secure that the "hot spot" of treatment is located in the diseased volume. Various techniques are illustrated, including the Finzi-Harmer fenestration technique for comparison. Fifteen cases were treated with teleradium; of these seven were alive and well, one lost sight of, and one died of intercurrent disease.

Cancer of the breast is still mainly treated by a combination of surgery and X-ray therapy. S. Cade³¹ refers to the important effect of the extent of the disease on choice of treatment and prognosis, and gives tables from published work to show how far the average results fall below the best. The following is a condensed table of the results obtained by G. Keynes with radium implantation, University College Hospital with surgery, and S. Cade by radium alone or surgery and radiation. The survival-rates are at 5 years.

STAGE	NET SURVIVAL WITH RADIUM (G.K.)	NET SURVIVAL WITH SURGERY (U.C.H.)	NET SURVIVAL WITH RADIUM OR SURGERY AND RADIUM (S.C.)
	per cent	per cent	per cent
1	71.4	69.1	87.7
2	29.3	30.5	29.6
3	23.6	—	25.4

He concludes that a combination of surgery with radiation is the treatment of choice.

The Value of Post-operative Therapy.—R. McWhirter,³² discussing this question, makes an interesting distinction between recurrence in the "treatable area", in which he includes the chest wall, the axilla, and the supraclavicular lymph-nodes, and metastases without this area which cannot be influenced by post-operative radiotherapy. He shows by a number of tables the improvement in the results at three years which have followed an agreed policy of combined treatment of all cases of cancer of the breast. Radical operation is followed by a carefully planned course of X-ray therapy, and the figures assessed at three years show:—

STAGE	TREATMENT	PERCENTAGE SYMPTOM-FREE
1	Radical surgery only	54
1	Surgery and radiotherapy	76
	Radical surgery only	28
	Surgery and radiotherapy	60
	Radical surgery only	21
	Surgery and radiotherapy	44

X-ray Therapy of Sensitive Tumours.—This calls for a different outlook, because the improved response due to local sensitivity is counteracted by the high malignancy and in some conditions by the multifocal nature of the tumours.

Even if the minimum lethal dose is less than half that of squamous carcinoma, it may be necessary to deliver it to all the main groups of lymph-nodes, so that tolerance is not that of a limited volume of tissue but that of the whole body. F. G. Medinger and L. F. Craven³³ discuss the possibility of *total body irradiation*, a method which has been attempted for many years: 270 cases have been treated at the Memorial Hospital, New York, from 1931 to 1940. The patient's whole body is irradiated from a tube built into the wall of the room and is given about 17 r per day measured in air at a distance of three meters: 94 cases of *Hodgkin's disease* were treated: 19 were alive—7 for less than five years, 4 were alive with disease, and 8 were alive and apparently well. The eight all had enlarged cervical lymph-nodes but were treated locally as well as by total body irradiation. In only 2 cases were the mediastinal nodes also involved. There were 30 cases of *lymphosarcoma*: 2 were alive with disease, 2 alive and well, after re-treatment. In *lymphatic leukaemia* some prolongation of life was obtained, but in *myelogenous leukaemia* there was no advantage over irradiation of the spleen, and in a few *reticulososes of other types* no very striking results were obtained.

A. U. Desjardins³⁴ discusses problems in the roentgen therapy of Hodgkin's disease and lymphosarcoma. He believes that incorrect treatment is the cause of failure to secure maximal improvement. It is essential to use fields which are large enough and numerous enough to cover all the involved lymph-nodes. For head and neck, particularly if the nasal sinuses may be involved, two to four fields, for the mediastinum four, and for the abdomen as many as eight fields, may be needed: 140 to 200 kv. has been used for this therapy; the author expresses a preference for the lower voltage even in some deeper lesions.

Another sensitive tumour is *seminoma of the testis*, which is discussed from the standpoint of roentgen therapy by L. A. Nash and E. T. Leddy.³⁵ They summarize recent work on the production of hormones, classify the tumours by hormono-histological grouping, and relate this to clinical signs and differential diagnosis. There is a considerable difference in radiosensitivity even if the non-embryonal tumours are excepted. The method of treatment recommended is to begin with operative removal of the involved testis. This is followed by X-ray treatment of the whole abdomen through eight portals, the mediastinum through two, and the left supraclavicular area through one; 130 to 140 kv. is used and the dose to each field is 540 r measured in air, one or two being treated daily. This is repeated after a month, the tolerance being checked by the blood-count.

Carcinoma of the oesophagus remains one of the most difficult conditions to treat and has been the subject of several studies. D. W. Smithers, J. R. Clarkson, and J. A. Strong³⁶ believe that the difficulty results from the advanced stage at which most patients seek advice, from the close relationship to vital structures, and from the rapid deterioration of health. Surgery, telerradium, interstitial radium, and radium bougies have all been tried. X-ray therapy, however, has the advantage that it is the most effective way to obtain palliation, while, if great care is used and treatment is early enough, the disease may be eradicated. At the Royal Cancer Hospital (London) a special study of dose distribution has been made and the best arrangement of fields has been selected. The isodose surfaces have been constructed and show that correct selection of fields allows the tumour lethal dose to be delivered to the smallest volume of tissue which can contain the whole tumour. From 1936 to 1939, 32 cases were treated. Six are alive for periods varying from 1 to 4 years; of these, four are well, one probably well, and one recurrent. Eight of the patients who died lived a year or more after treatment and one more than two years. J. A. C. Fleming³⁷ stresses the importance of the length of the primary tumour in relation to

metastatic deposits: 34 cases on which post-mortems had been performed were studied. If the growths were less than 5 cm. in length, only 5 per cent had metastases, but if they were over 5 cm. in length 53 per cent had metastases. It is therefore suggested that when attempting the radical therapy of a primary cancer of the œsophagus, shorter fields than those generally used would be adequate. In a discussion on beam direction, F. Ellis³⁸ describes a method of securing accuracy in the treatment of cancer of the œsophagus. A circle is supported horizontally round the patient, with rods fixing the circle in relation to the tumour and other rods fixing the entrance and exit points of the beam of radiation. A. Green³⁹ adds to previous descriptions of his directional calliper for the radium beam, that of a calliper for use on an X-ray tube based on the same principles; also his parallelogram method, a simple arc method, and a predetermined shape method. He also discusses the measurement of mechanical compression and stabilization of the patient. J. L. Dobbie⁴⁰ prefers a black pointing director fitted to the tube, with the patient's position and the localization of the tumour controlled by a rigid envelope.

Subcutaneous X-ray Therapy.—A new method of overcoming the limiting tolerance of the skin is described by T. A. Watson.⁴¹ The well-known difficulty of treating secondary carcinoma in lymph-nodes has suggested a different approach. Under full aseptic precautions the skin over the area to be treated is incised and lifted back in flaps. The lymph-nodes should then be visible in the centre and must on no account be damaged. A sterile metal applicator is placed in position, the X-ray tube is brought down to it, and the exposure given. The skin flaps are replaced and the incision closed. The Chaoul type of contact X-ray tube, and a 250-kv. therapy tube, have been used without difficulty. The main advantage is that a dose above skin tolerance can be given, and because the high tolerance of connective tissue is thus exploited the possible superiority of fractionated dosage is outweighed.

THE EFFECTS OF OCCUPATIONAL EXPOSURE TO X RAYS AND RADIO-ACTIVE SUBSTANCES

This subject has again attracted attention because of the extension of industrial processes involving such exposure required for war production. W. Binks⁴² points out that X-ray apparatus designed for crystal analysis has a very high output and the intensity at 10 cm. from the window, the distance at which the specimen is normally examined, is very high. If the specimen is handled while it is in the beam, or if the hand is used as a test object for screening purposes, severe injury may result. For other industrial purposes, the exciting voltage of the X-ray tube may have to be very high, and the protection of such a tube and the hours of work should be such that the radiation received by the operator should not exceed 12 r per week. Protection is obtained by the use of lead, or lead equivalent, screening, and, if possible, by operating the tube from outside the X-ray room. In a discussion on the subject J. R. Nuttall⁴³ describes the dangers of excessive exposure during the treatment of patients by means of radium and X rays. He concludes that modern technical improvements have made it possible for X-ray work to be safe for all except the culpably careless, but that there is room for further regulations with regard to the clinical use of radium. S. Russ describes the steps which had been taken to determine the quantity of radium which could be tolerated in the body, an investigation suggested by the examination of employees, known as luminizers, who worked an illuminating paint containing radium salt. J. M. Vaughan found no evidence of serious injury to the blood due to ordinary occupational exposure, but that ingestion of radio-active substances by mouth led to dangerous dyscrasias.

The British X-ray and Radium Protection Committee have issued a revised report.⁴⁴ They recommend systematic blood-counts on personnel engaged in radiological work, accurate calibration, and, where radon gas may enter the atmosphere, a specially prepared room with an exhaust fan controlled from outside the room. The radon in the air in any working quarters should not exceed a concentration of 10^{-10} curies per litre.

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RECTUM. (See also PERIRECTAL SUPPURATION.)

RECTUM, CANCER OF.

W. B. Gabriel, M.S., F.R.C.S.

Diagnosis.—E. W. Shearburn¹ writes on the importance of adequate rectal examination, and analyses 100 consecutive cases of rectal cancer admitted into the University of Virginia Hospital. It was found that in practically all cases the tumours were palpable from below, but in only 36 per cent had the examination prior to admission into hospital been adequate; in 33 per cent an entirely inadequate examination had been done, the cases being treated symptomatically, or else, in a number of instances, a useless hæmorrhoidectomy had been done. In 26 per cent the previous examination had been of questionable value, and 5 patients came direct to the hospital. So far as operability was concerned, the highest operability-rate (47 per cent) occurred in the group who were adequately examined by their local doctors. The lowest rate of operability (23 per cent) occurred in the group whose previous examination had been of doubtful value. Other data given merely serve to emphasize the importance of an ordinary digital examination of the rectum at the earliest opportunity once the patient consults a physician with a history of a change in bowel habits and blood or mucus in the stools. Three typical case-reports of missed diagnoses are given,

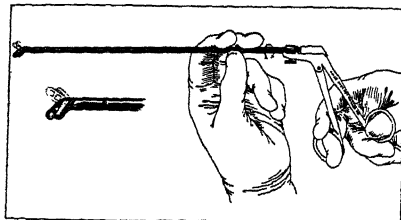


Fig. 26.—Showing biopsy forceps and a diagrammatic view of the rotary movement of the shaft. (Reproduced from the 'Annals of Surgery'.)

R. Turell² describes a new biopsy forceps (Fig. 26). The shaft has a rotating mechanism with a locking device near the handle permitting a 360° rotation of the jaws. Thus when a growth of any sort has been visualized through a

in each of which the rectal growth was easily palpable by digital examination. At the same time it is recognized that in many cases the patient is at fault in delaying consultation with his physician due to embarrassment at the thought of a rectal examination or to the fact that the early symptoms cause little discomfort and no incapacity. Besides this, in the author's series 17 patients refused operation or treatment after the diagnosis had been established.

sigmoidoscope the shaft can be rotated so that the cutting jaws face any desired quadrant. The cutting jaw mechanism operates at an angle of 30° from the axis of the shaft; half the jaw is fixed and the other movable jaw opens and closes sideways. It is claimed that this mechanism renders it easy to remove mucosal excrescences or small adenomas for microscopical study. The jaw capacity is ample. The instrument is made in different working lengths, the one illustrated being 40 cm. The makers are the American Cystoscope Makers, Inc., New York, N.Y., U.S.A.

Abdomino-perineal Excision.—Several papers deal with varying aspects of radical excision of the rectum. Charles W. Mayo³ reports a recent series of 171 cases of abdomino-perineal excision with only 2 deaths (1.17 per cent). This remarkably low operation mortality was achieved by special care at all stages—pre-operative preparation, anaesthesia, operative technique, and post-operative care. A dose of “antiperitonitis” vaccine was given in all cases 48 hours before operation. Anaesthesia was generally a combination of spinal and intravenous pentothal sodium. The operative technique seems to have followed a fairly standard course, except that a mid-line colostomy was established, the colon being brought out first through the left rectus muscle. The lateral space between the colostomy and abdominal wall was closed in only a small percentage of cases. Post-operatively all patients received 500 to 1000 c.c. of blood, together with high concentrations of oxygen for at least 24 hours, either in an oxygen tent or by means of the B.L.B. mask. Patients should be kept moving in bed, and in most cases they were allowed to dangle their legs over the side of the bed on the 9th post-operative day and to get out of bed on the 10th day. Between 80 and 85 per cent of patients were up and out of the hospital in less than 3 weeks after the operation.

Thomas E. Jones⁴ gives a very interesting analysis from the Cleveland Clinic of complications noted after more than 500 cases of abdomino-perineal excision. It would appear that one of the most valuable innovations has been the use of steel alloy sutures for the abdominal wall; they eliminate the necessity for stay sutures, and wound infection has dropped to 0.85 per cent compared with an incidence of 28 per cent in an earlier group in which catgut was used. Coincident with the elimination of abdominal wall sepsis there has been a marked reduction in mortality to 4.5 per cent in the last 261 cases. By far the most distressing complication is in regard to the bladder, and cystitis to some degree occurs in about 95 per cent of cases. The problem of continuous versus intermittent catheterization is discussed, also the use of chemotherapy. In male cases, if the bladder is not improving after the patient is out of bed, cystoscopy is carried out and trans-urethral resection is occasionally required. In patients with bladder symptoms *before* operation a trans-urethral resection has been done many times *before* excision of the rectum. After abdomino-perineal excision about 95 per cent of men become impotent: why 5 per cent should be exempt is difficult to explain since the operation is the same in all cases; possibly in a few cases the *nervi erigentes* escape.

J. H. Garlock, L. Ginzburg, and A. Glass⁵ also speak highly of the use of steel alloy wire in the form of buried figure-of-eight sutures, and in a series of over 1000 laparotomies have had no instance of wound disruption. Routine *pre-operative* administration of sulphanilamide is recommended before operations on the large bowel, and it is considered that this drug has a definite value in reducing the incidence of post-operative peritonitis and wound infection. The authors are not enthusiastic about the use of sulphanilamide powder locally in the abdominal wound. In a series of 85 cases of rectosigmoid and rectal carcinomas they had 51 operable, or 60 per cent; of these 36 were treated by abdomino-perineal resection, with a mortality of 16.6 per cent. Concluding

their paper these authors mention that between 20 and 25 per cent of the patients admitted to hospital with carcinoma of the rectum had undergone treatment for hæmorrhoids during the preceding 2-5 months. This emphasizes the importance of digital and proctoscopic examination, and conforms with the views expressed in the paper by Shearburn abstracted at the beginning of this article.

G. D. Oppenheimer⁶ describes some cases in which trans-urethral resection of the prostate has been carried out with good results after abdomino-perineal excision. The operation has also been beneficial in some cases of vesical neck obstruction associated with weakness of the detrusor bladder muscle after excision of the rectum. A case of local recurrence of a rectal carcinoma invading the prostate and causing urinary symptoms has also been astonishingly relieved by this operation in conjunction with high-voltage X-ray therapy. A photomicrograph of the trans-urethrally resected tissue is depicted showing an infiltrating adenocarcinoma similar to the original rectal carcinoma. This patient remained well more than 8 years after the abdomino-perineal excision and 17 months after the endoscopic resection. Other cases described have received temporary palliation only. The author mentions the difficulty which is sometimes experienced in distinguishing primary cancer of the prostate from recurrent rectal carcinoma invading the prostate, and suggests that biochemical estimation of the serum acid phosphatase may be of assistance: primary prostatic cancer with metastases usually gives an elevated serum acid phosphatase, whereas in primary rectal cancer with or without prostatic involvement the determination should be normal. A new staining method for tissue resected transurethrally is also mentioned. The author refers to the occasional difficulty in diagnosis between carcinoma of the prostate and a low anterior-wall primary carcinoma of the rectum.

Pathological Aspects.—Surgeons who undertake major operations for excision of the rectum and colon for cancer should study a paper by G. E. Binkley, J. C. Abels, and C. P. Rhoads⁷ (from the Memorial Hospital, New York). The authors preface their paper with the remark that "The physiologic derangement of patients with cancer of the colon or rectum deserves careful consideration when surgery is contemplated", and the facts brought out in their paper amply justify this opinion. Successful surgical treatment depends a good deal on the patient's ability to maintain normal levels of serum protein and a satisfactory status of liver function, and there is evidence to show that a persistent hypoproteinæmia may result in tissue oedema, ascites, altered motility of the gastrointestinal tract, wound disruption, and increased susceptibility to infection. Out of 65 cases of cancer of the colon and rectum studied, hypoproteinæmia was noted pre-operatively in 23, or 36 per cent. After operation 56 out of the 65 patients (86 per cent) had abnormally low levels of serum protein.

THE PRE- AND POST-OPERATIVE LEVELS OF SERUM PROTEIN IN PATIENTS WITH CANCER OF THE RECTUM AND COLON

SERUM PROTEIN g. per 100 ml.	NO. OF PATIENTS PRE-OPERATIVELY	NO. OF PATIENTS POST-OPERATIVELY
4.6-5.0	0	4
5.1-5.5	3	21
5.6-6.0	3	21
6.1-6.5	17	10
6.6-7.0	21	6
7.1-7.5	18	2
7.6-8.0	3	1

After a major operation a normal level of serum protein can best be maintained by the use of blood transfusion or intravenous plasma, and, when the patient can tolerate food after operation, by high protein diets. In a group of 14 patients

PLATE XXXIV

CANCER OF THE RECTUM: THE DEVINE COLOSTOMY

(C. G. HEYD)

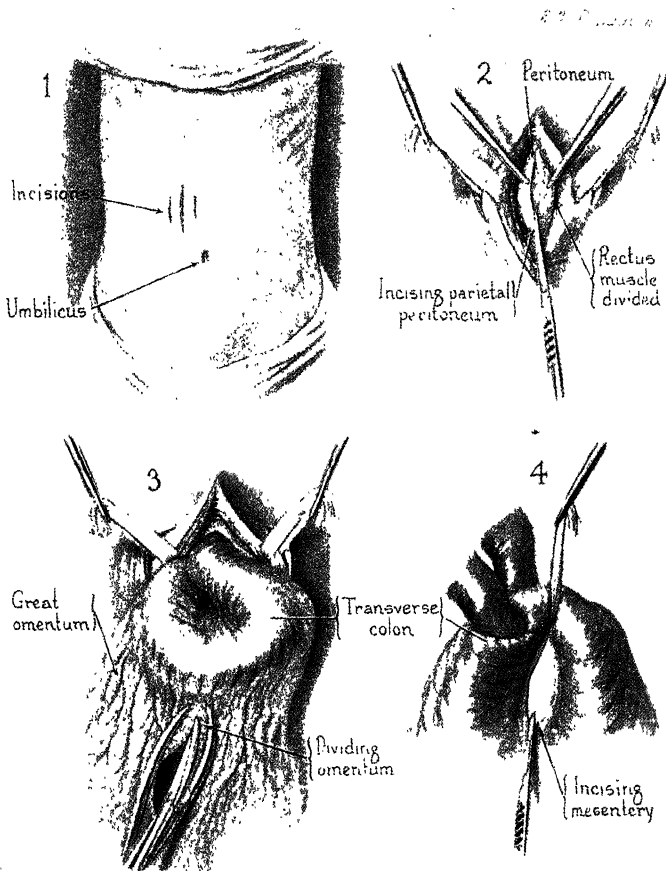


Fig. A.—1, Relative position of the incisions; 2, Undermining skin with gauze retraction; 3, Dividing the great omentum to permit evisceration of colon; 4, Tape introduced through open space to produce "double-barrelled colon".

Plates XXXIV, XXXV reproduced from the 'Annals of Surgery'.

PLATE XXXV

CANCER OF THE RECTUM: THE DEVINE COLOSTOMY—continued

(C. G. HEYD)

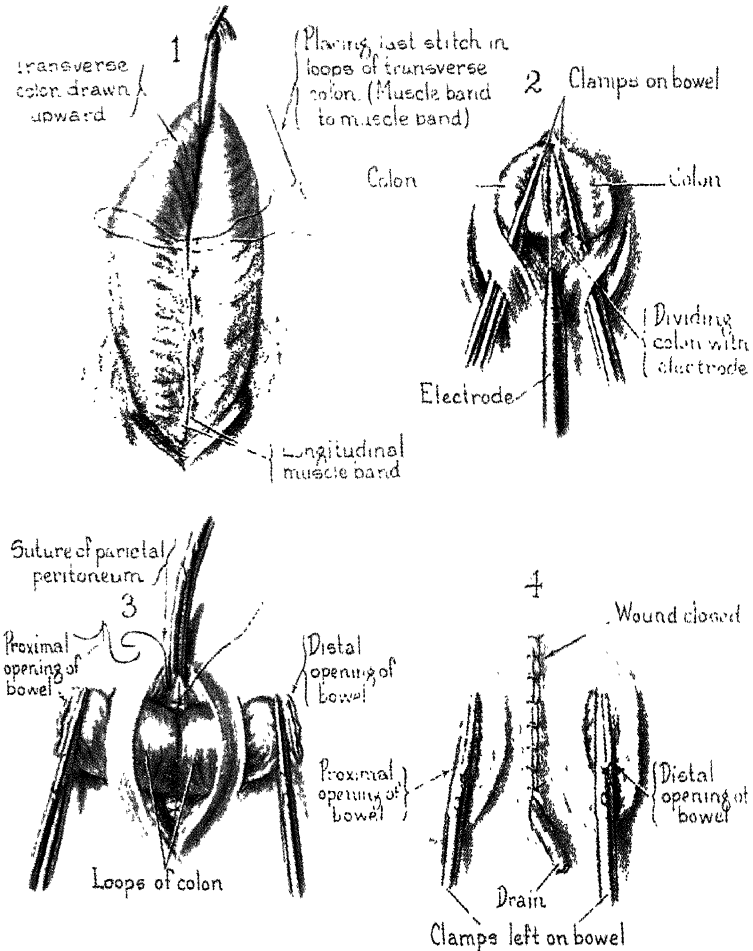


Fig. B.—1, Approximation of white bands by sutures; 2, Bowel segments clamped and divided by cautery; 3, Exits of the proximal and distal loops; 4, Final appearance of wounds of a Devine colostomy.

studied at intervals, varying from 20 to 150 days, since their last infusion of blood or plasma, it was found that with but one exception their serum protein levels were significantly higher than during the first post-operative week—this therefore would appear to be the most critical time. Ability to counteract hypoproteinæmia was greatly handicapped by the presence of acute infections, which may have an effect on the liver or increase protein catabolism. Eighteen patients had infections of the genito-urinary tract, and it was found that greater amounts of blood and plasma were required to combat hypoproteinæmia in these patients than was needed in patients without infections. The difficulty of treating hypoproteinæmia in the presence of infection is shown by the finding that 55 per cent of patients with infection of the bladder had a delayed serum protein rise (14 days or more), whereas of the patients without bladder infection, 29 per cent showed a delayed protein rise. The authors believe that correction of post-operative hypoproteinæmia is in great part responsible for the decreased mortality among patients with cancer of the rectum and colon.

R. S. Grinnell⁸ has made a pathological study of the spread of cancer of the rectum; he deals in this paper with spread by the lymphatic and venous systems. For investigating the extent of lymphatic spread the Spalteholz clearing method has been used, and he claims that this method enables a greater number of lymph-nodes to be found than would be possible by other methods. In 75 cleared specimens, the majority obtained by abdomino-perineal excision, lymphatic metastases were found in 55 per cent. The inadequate lymphatic clearance given by perineal excision is shown by the fact that out of 10 perineal excisions 4 (or 40 per cent) had the most proximal lymph-node involved, but after abdomino-perineal excision there were only 5 cases in this group out of 62 operations (8 per cent). Upward lymphatic spread along the superior hæmorrhoidal vessels usually occurred in an orderly manner; discontinuous upward spread, however, occurred in 7 out of 41 cases with lymphatic metastases. Lateral and downward spread were very rare, and only occurred when massive lymphatic obstruction had occurred high up. Venous spread was found in 36 per cent of the 75 specimens studied. The frequency of venous involvement increased with the grade of malignancy and also according to the depth of spread. Thus when classified by Dukes' method 16 per cent of A cases showed venous invasion, 31 per cent in B cases, and 60 per cent in C cases. [These figures are considerably higher than those recorded by Dukes and Bussey which were 0 per cent, 16·4 per cent, and 21·1 per cent for the A, B, and C groups, in the MEDICAL ANNUAL for 1942, p. 270.—W. B. G.]

Grinnell has also investigated the liability to visceral metastases, and finds, as might be expected, that large veins containing tumour cells are far more likely to have distant metastases than microscopic ones. No A case was found to have produced visceral metastases, but blood-borne metastasis in B cases, i.e., before involvement of the regional lymph-nodes, is not as rare as has hitherto been believed.

Use of the Devine Colostomy.—C. G. Heyd⁹ writes an interesting and well-illustrated article on the Devine "dysfunctioning" colostomy (*Plates XXXIV, XXXV*). He considers that the best place to bring the transverse colon out is through the right upper rectus. A short incision is made on each side of and parallel to the main incision about 3 cm. from it; after preparing the selected loop of transverse colon, clamps are applied and the two openings of the colostomy are brought through these secondary incisions so that when the original incision is closed they are separated by about 5 cm. of normal skin. Heyd describes cases illustrating the use of this technique in the surgery of the colon and also (1) as a preliminary to an abdomino-perineal resection when the growth is associated with an extreme degree of inflammatory adhesions,

(2) as a preliminary to resection and a low end-to-end anastomosis for a rectosigmoid carcinoma. The author concludes that the Devine colostomy has a wide range of application either as a preliminary or first-stage safety operation, or it may be continued as a permanent colostomy.

RECTUM, ENDOMETRIOSIS OF.

W. B. Gabriel, M.S., F.R.C.S.

Endometriosis of the rectum was last reviewed in the MEDICAL ANNUAL for 1941 (p. 323) from the paper by Mayo and Miller. This year we have a long and important study by E. L. Jenkinson and W. H. Brown¹ based on 117 cases. Constricting endometrial lesions of the rectum and sigmoid colon are often confused with carcinoma. In the authors' series the youngest was 18 years old, the oldest was 67, and thirty were 30 years old or less. Most patients with endometriosis have a relatively long history, the average duration in this series being 2.8 years. A high incidence of sterility and of menstrual abnormalities was noted, together with a long history of bowel symptoms suggesting an obstruction. Loss of weight or other evidences of ill health were seldom present.

Severe progressive constipation with pain in the lower abdomen, worse during menstruation, was the most common complaint. Sigmoidoscopy may show narrowing of the bowel lumen, with intact but puckered and congested mucosa. The mucous membrane is rarely sufficiently involved or ulcerated to permit of a biopsy establishing the diagnosis. Consequently there is a low incidence of gross or occult blood in the stools. Endometriosis rarely causes loss of weight or cachexia. In the present series 21 patients had constriction lesions in the rectosigmoid, the chief characteristics noted being: (1) *A filling defect of considerable length*, involving 4-7 inches of the bowel lumen; (2) *A sharp demarcation of the filling defect similar to that of carcinoma*; (3) *The remainder of the colon showed little evidence of disease*; (4) *Screen examination and air contrast films showed an intact mucous membrane*; (5) *The involved bowel was relatively fixed and exquisitely tender on palpation*.

Endometriosis of the rectosigmoid should be differentiated from carcinoma from the facts just stated, principally the younger age group, associated sterility, menstrual disorders, absence of loss of weight and anæmia, and long duration of symptoms. Exacerbation of symptoms coinciding with the menstrual period is confirmatory evidence of endometriosis. Treatment in patients under 35 years of age should be conservative if possible; it is rarely necessary to resect the bowel. Double oöphorectomy is usually necessary in those cases, irrespective of age, when the colon and rectum are involved. In the present series all patients with constricting endometriosis of the rectosigmoid who were treated by removal of both ovaries had complete restoration of the bowel lumen when examined two months or more after operation.

REFERENCE.—¹J. Amer. med. Ass. 1943, 122, 349.

RECTUM, LYMPHOID TUMOURS OF.

W. B. Gabriel, M.S., F.R.C.S.

Tom E. Smith¹ reports 3 cases of hæmorrhoidectomy done for second-degree piles in which the tissue removed at operation was sent for routine microscopical examination and unsuspected lymphoid tumours were discovered; namely, one lymphosarcoma (patient aged 42 years) and two benign lymphomas (ages 36 and 21). X-ray therapy was given to the patient with lymphosarcoma and she was free from recurrence 18 months later; the cases of benign lymphoma were cured by local removal and have not recurred. In each case there was some induration in one primary pile resembling a thrombosis, and the author

stresses the importance of routine pathological examination of tissue removed at operation, even though it may appear to be of no surgical importance on clinical examination.

REFERENCE.—¹*J. Amer. med. Ass.* 1943, **121**, 495.

REHABILITATION.

Frank D. Howitt, C.V.O., M.A., M.D., F.R.C.P.

It must be admitted at the outset that this term is a most unfortunate one. It is an evasion which came into prominence in the early days of the war as the result of the sudden realization on the part of the medical profession of its previous shortcomings in relation to the supervision and treatment of patients during the later stages of disease and disability. In point of fact, no new discovery was made; merely an appreciation of the fact that the doctor must not relinquish his responsibility when the immediate repair of damage has been effected, but that, in conjunction with his colleagues, he is equally concerned with the ultimate reinstatement of his patient. It is also part of the awakening concept that medicine of the future must be less departmentalized, and be more concerned with team-work, in which the physical, psychological, social, and environmental aspects must all be borne in mind.

Rehabilitation involves the study of the whole man. It is one continuous process, beginning at the moment when the patient is deemed to be able to take an active interest in his recovery, progressing through the ambulant and out-patient stages, and ending with his final hardening to the requirements of his original job.

If the damage has been so severe as to preclude this possibility, then the patient must be trained for an occupation most fitted to his resultant capacity. This second aspect of the problem is known as 're-vocation'.

There is also a third aspect—prophylactic in character—which has been dignified in America by the term 'pre-habilitation'. For, whereas many cases presenting themselves at hospital are the result of trauma or of sudden medical catastrophe in previously fit people, many others are the result of deviations from the normal, which have progressed insidiously until symptoms have eventually necessitated medical advice.

It will be seen, therefore, that the term 'rehabilitation' embraces a wide sphere, and is intimately connected with contemporaneous ideas germinating in many quarters, under such titles as 'Positive Health', and 'Social Medicine'. It is an expression of yet another realization which is being borne in upon the medical profession—namely, that it must, in the future, concern itself with the problems of the achievement and maintenance of health, equally with that of established disease.

Rehabilitation should not be deferred until the patient reaches the out-patient or convalescent stage. It is not sufficiently appreciated to how great an extent his general physical condition may be maintained whilst he is still in bed. There are, of course, certain contra-indications, such as age, pyrexia, exhaustion, or pain, which preclude physical re-education during this stage, but in many cases convalescence is materially shortened by the early institution of massage, assisted and resisted exercises, and active and passive movements. Provided muscular contraction and relaxation are carried out systematically and under precise medical prescription the damaged structures do not suffer. Deterioration is reduced to a minimum, so that when the patient proceeds to the out-patient department, or to the convalescent depot, it should not be then necessary to begin a process of general reconditioning.

The out-patient department of a large hospital should contain both health and curative services. There should be more collaboration between the various specialist medical branches, and between doctors and medical auxiliaries.

There should also be more co-operation between the different medical auxiliaries themselves, including physiotherapists, occupational therapists, physical educationalists, lady almoners, dietitians, and chiropodists. Neither should the educational and social services be forgotten. In the Army, the Education Corps renders valuable hospital assistance by maintaining a continuous service on behalf of the man as a soldier. This practice should be extended to civil hospitals, where facilities should be available to enable a patient to keep in touch with his trade or profession, and even to allow him the opportunity of increasing his technical knowledge, whilst still under medical care.

In the out-patient department, the work done in the ward should continue without interruption, but it is most important that the hospital atmosphere should now be kept in the background. It is desirable, however, at this stage to substitute more active measures of increasing severity, such as resisted exercises by the weight and pulley method, which can be adapted for the graduated exercise of any muscle group.

The importance of carrying out remedial work in classes cannot be over-emphasized, but its success depends upon the personality of the instructor. In order to inculcate and maintain a spirit of enthusiasm and genuine self-effort, a vital atmosphere must be created, and complete harmony must exist in the class. In this way the patient is made to rivet his attention upon the performance of his exercises as a member of a team, rather than upon his own particular medical misfortune. The patients should be grouped according to their disabilities—plaster cases, hernia cases, chest cases, and so on—and the remedial exercises which are designed to meet each special demand should be arranged in sequence of increasing severity. Systematic progression in all physical treatments is a fundamental principle of rehabilitation. Games of a quickening, stimulating, and co-ordinating character should be interspersed in the schedule, so that remedial training by interest is made the keynote of instruction. Wherever possible, the patient should be returned to his work in a physical condition at least as good as that in which he left it.

The war has emphasized the need for the training of hospital medical students in the principles of physiotherapy and indeed of all the methods employed in rehabilitation, and it is to be hoped that provision will be made for its inclusion in the syllabus of the future. This should include instruction in the essential indications and contra-indications of active and passive movements, the physiological and psychological effects of long and short actinic rays, the penetrative effect of heat applied by conduction, radiation, and diathermy, and the use and abuse of galvanism and faradism. For faced with an incorrect or inadequate medical prescription, the physiotherapist is apt to feel that her skill and knowledge are being wasted, and her work in consequence becomes mechanical. And in the absence of medical guidance and interest, she may become enthusiastic over one or other form of treatment in which she may consider herself particularly proficient, and which may not be indicated on clinical grounds. Meanwhile the patient forms a habit and sometimes even an affection for some of the more soothing forms of physiotherapy long after their useful purpose has been served. In the earlier stages of disease and disability, the psychological support which physical treatments can give may reinforce their practical value, but they must never be allowed to stagnate and thus retard the patient's urge to recovery. Passive treatment must, therefore, give place to active methods at the earliest opportunity.

Occupational therapy is another auxiliary medical service, which has for long been available and practised in all the major hospitals in Germany, America, and Canada. Such was the shortage of trained technicians in this country on the outbreak of war that it was found necessary to call upon Canada to assist

in supplying the demand. As is so common, however, on the introduction of a new form of treatment, this omission is now being rectified with such fervour that there is a danger of lack of perspective in relation to other physical methods.

Occupational therapy may be considered under two headings—diversional and remedial. Diversional work is of value mainly in bed-cases, and is directed towards the relief of boredom and the production of a creative interest in the mind of long-term patients. Provided the work is disciplined, and under medical supervision, it may be entrusted to an unskilled teacher. Remedial occupational therapy, on the other hand, demands the services of a fully qualified technician. The choice, utilization, and adaptation of different crafts in the re-education of muscles, joints, and nerves necessitates a knowledge of anatomy, pathology, and psychology. Special technique is also required in psychiatric cases.

There comes a time in the convalescent stage of all serious disease and disability when an assessment must be made as to whether the patient will be able to return to his former employment, whether some modification of his original work will be necessary, or whether a new vocation must be found for him. The decision should be made as early as possible, particularly in the last event—re-vocation—so that the trained occupational therapist may be at the bedside discovering the patient's proclivities and potentialities, stimulating his interest, and educating him in the early stages of his new occupation. In this way, he may graduate without interruption into a new and profitable undertaking. If, for instance, a postman has lost his foot, it will be very difficult for him to recapture, some months later, his urge to a new endeavour, however well his immediate disaster has been treated in the meantime. A closer liaison is therefore needed between the medical profession and those responsible for reinstatement in industry, if the number of neurasthenics, beggars, habitués at out-patient departments, and incumbents on charitable institutions is to be curtailed in the future.

The *preventive* aspect of rehabilitation concerns the supervision and correction of early deviations from the normal. This is the problem which the Army set itself to solve by the institution of its Physical Development Centres. The medical profession, before the war, had been alive to the need for a closer co-operation between the health and education services, but no national training centre was in existence where research into the preventive and corrective aspects could be carried out. In schools physical training was in the hands of teachers who had received the usual instruction included in the teachers' training college course. In factories, physical fitness was left to the generosity of employers, with such assistance as they might obtain from voluntary organizations. And in the intermediate and most important period of adolescence, during which a man's future is made or marred, nothing was available to the working classes with the exception of evening institutes, certain youth centres, and isolated clubs and organizations which struggled in a parochial way to promote physical fitness.

Pre-rehabilitation is an integral part of national physical fitness. Every school child should be medically examined at regular intervals by doctors trained in the early symptomatology of remediable disabilities. Those requiring it should be referred for corrective treatment before the stage of fixation or superimposed disease is reached. Cases of poor physique due to underdevelopment and malnutrition, abnormalities due to postural, occupational, and environmental causes, and early local skeletal defects should be singled out for special treatment. Such cases should be handled with as much or even greater care as they would ultimately have received when their symptoms had progressed to the stage of hospitalization.

Investigation and control of this important period demands a catholic outlook. It involves, in addition to routine medical examination, a wide medical control, including supervision of diet, both qualitative and quantitative, advice as to the prevention of fatigue and the proper use of leisure, insistence upon skin stimulation and upon dental and foot hygiene, inquiry into the sociological and environmental conditions, and a host of problems of a vary varied nature.

Another, and most important, sphere of medical usefulness, so far almost untouched by the profession, is *advice as to the selection of vocation*. The more fortunate members of the community are able to make up their minds at an early age as to which trade or profession they wish to adopt, and are lucky enough to have the opportunity of following it. Others, because of social or environmental circumstances or because of a short-term policy of economic return, are lured into a vocation entirely unsuitable. Industrial psychology has concerned itself with the correct placement of operatives on grounds of aptitude and intelligence. A collateral assessment is also needed on physical grounds. The young apprentice is sorely in need of guidance in the selection of his career, and such guidance can only be correctly undertaken by a doctor.

Purposeful training for individual employment should follow as a natural sequence upon selection, in the achievement of maximum physical efficiency. It is surprising how inept is the uninstructed individual in even the simplest tasks, such as digging, jumping, lifting, and climbing. Correction of faulty technique may not only prevent disability or even deformity, but is productive of considerable economy of energy. There is no end to the scope of advice which could be applied to occupational problems of this kind. Before the war certain industrial concerns had taken up the question of purposeful training for different occupations involving the use of lathes, hammers, or precision tools. There is a need for extension of such instruction on scientific lines.

Unnecessary positional discomforts, although minor in character, assume a major factor in the causation of symptoms when endured over long periods of time. In this respect the case of the lorry driver may be instanced. The makers of certain vehicles, in their desire to obtain the maximum of durability, space for contents, and other commercial desiderata, have reduced the driving space, placed the gears in awkward positions, rendered the clutch extremely stiff, and forced the driver into a position of extreme discomfort. The back-support, the function of which should be, not only to maintain a normal sitting posture, but also to act as a fulcrum for the necessary leverage, is often inadequate in size, angle, and adjustability. In the treatment of cases of pain in the low back, sciatica, stiff neck, or brachial neuritis, there is need for more detailed investigation as to the cause, and of correction of the trouble at its source, by the medical profession.

As another example, the case of the clerk or sedentary worker may be taken. Many of these work long hours in rooms which are necessarily maintained at a high temperature. In some cases the rooms are noisy owing to the nature of the work in progress. The lighting may be inefficient and the air ill-conditioned. A most important point, often not sufficiently considered, is the effect of boredom, due to the endless monotony of the work. The symptoms complained of—fatigue, both mental and physical, lassitude, and lack of concentration—might be countered by the restrained use of exercise, organized games, artificial sunlight, and last, but not least, advice on relaxation and the proper use of leisure. It is precisely the tense individual working in an exacting occupation who seldom realizes the need for, or acquires the art of, complete relaxation. It is the man who is doing a dull and boring job who will benefit by some degree of excitement when off duty.

Rehabilitation cannot, therefore, be dismissed as a treatment or series of treatments. If the word means anything at all, it is the expression of a wider philosophy, and the concept of a wider sphere of medical usefulness which shall permeate not only hospitals and re-conditioning centres, but also education and industry themselves. It presupposes that the medical profession must not restrict itself to the immediate cure of disease, but must also guide the general welfare of the community in the achievement and maintenance of health, in the selection and training for vocation and re-vocation, and in the prevention and correction of disease and disability, equally as in their remedy. It is a social issue in which every Ministry is concerned, but in which, surely, medicine must take the lead.

RELAPSING FEVERS.

Sir Philip Manson-Bahr, C.M.G., D.S.O., M.D., F.R.C.P.

J. B. Hamilton¹ has recorded observations on the occurrence of *ocular complications* in relapsing fever in the Middle East. In an Australian General Hospital, Hamilton studied 28 cases of relapsing fever from the Western Desert. Four of these developed uveitis, whereas in 63 cases from Syria there were no eye troubles.

The ocular complications were acute iridocyclitis and chronic cyclitis with persistent headache. A gross vitreous exudate was a marked feature in both forms. The headache is ascribed to an encephalitis. Sufferers from iridocyclitis developed massive posterior synechiæ which were broken down by mydriatics. Despite the cyclitis and changes in the vitreous no choroiditis was observed and the prognosis as regards vision was good. In this particular series the eye complications were unilateral. Other complications noted were facial paralysis, herpes labialis, and encephalitis. In some facial paralysis was permanent. The author is of the opinion that the Syrian form is tick-borne whilst the desert fever is louse-borne and that this may explain the liability of the latter to cause ocular complications. The incidence of uveitis in the Western Desert cases is estimated at 20 per cent.

REFERENCE.—¹*Brit. J. Ophthalm.* 1943, 27, 68.

RENAL DISEASES. (See also KIDNEYS, SURGERY OF.)

Sir Henry Tidy, M.D., F.R.C.P.

Renal Function Tests.—M. Hertz¹ (Copenhagen) has attempted to devise a renal function test to express the total function of the kidneys in the course of 24 hours. Blood-urea analyses were made on 4 healthy individuals on ordinary diet and it was found that the urea varies greatly in the course of the 24 hours. By reducing the proteins in the diet it was found that the fluctuations were much smaller. A diet was then composed containing 50 g. protein, and with this it was found possible to keep the blood-urea of 37 individuals relatively constant during the 24 hours. Measuring the blood-urea on this diet for two consecutive mornings gives an expression of the average blood-urea value for the whole day. In 90 per cent of the tests the average blood-urea for the two mornings showed a deviation of ± 6 per cent from the actual average. The 24-hour urea clearance was estimated in 22 persons and the results compared with the ordinary one-hour clearance. The value of the maximum 24-hour clearance in different individuals varied between 21 and 68. It is always lower than the one-hour maximum clearance and this is ascribed to the diuresis after water ingestion. Although the clearance is constant throughout the day, nevertheless, if tests are repeated in the same individual on subsequent days, variations are found of dimensions similar to those which occur in repeated one-hour clearances during

a single 24 hours. There is no close relationship between the 24-hour clearance and the one-hour clearance by the ordinary method. [This is an interesting study, but it would appear that the limits of normal for the 24-hour test are at least as great as for the one-hour clearance.—H. L. T.]

N. M. Keith and others² (Rochester, Minn.) have studied the *serum concentration and renal clearance of potassium*, in 33 cases of severe renal insufficiency. They find that the concentration of potassium in the blood-serum tends to vary widely. The range was from 12 to 40 mg. per 100 c.c. in the various cases as compared with a normal range of 17 to 21 mg. The tendency to wide variations applies also to individuals when tests are repeated, but it was found that patients with persistent severe renal insufficiency who have a low or normal value for serum potassium on a single occasion will usually subsequently be found to have an abnormally high concentration of potassium. In 3 cases the concentration of potassium in the serum was abnormally high although the urea was not extremely high. In 1 case there was a gradual decrease in the concentration of serum potassium as the renal insufficiency increased. The injection of a potassium salt may cause a distinct temporary increase in serum potassium in the sick person as it will in a normal individual. Although it might be expected that potassium salts would have toxic effects in patients with severe renal failure it has been repeatedly observed that large doses of such a salt may be injected into patients suffering from chronic nephritis with oedema without noticeable harmful results. Although it seems clear that potassium metabolism may be disturbed in the presence of renal disease, the authors are of opinion that this disturbance cannot be as readily demonstrated as can that of some other substances actively excreted by the kidney. A single estimation of the concentration of serum potassium in the presence of severe renal insufficiency may give a result that is normal, increased, or decreased.

Pathogenesis of Bright's Disease.—G. L. Hunner³ (Baltimore) discusses the *relationship of ureteric stricture and Bright's disease*. He believes that ureteric stricture may be an important factor and describes 9 illustrative cases. The symptoms typically associated with ureteric stricture are similar to those of the early stages of Bright's disease. Pronounced symptoms of the disease such as persistent headaches, nausea, and convulsive seizures have yielded promptly to the establishment of good renal drainage. The author is of opinion that this is the only possible explanation of the beneficial results obtained in his cases. Four of the patients had survived the operation in fairly normal activities for periods between 5 to 9 years. Without adequate renal drainage it is doubtful whether any of these patients could have lived for even one year. The remaining 5 patients are still alive and active over 20 years since their first treatment. The author believes that none of these persons would have been living to-day had it not been for the operation.

G. O. Richardson⁴ (Edinburgh) has studied the *incidence of atherosclerosis in the main renal arteries in essential hypertension*. His material consisted of 32 autopsies of patients with essential hypertension and 113 without hypertension. In 25 of the 32 hypertensives there was apparent stenosis of one or both renal arteries by atheromatous plaques, in 12 of which the lesions were limited to the aorta. In the remaining 7 cases there were no sclerosing lesions of the main renal arteries. In 8 cases with unilateral stenosis microscopic examination failed to show any difference between the two kidneys. Among these were 3 cases with malignant hypertension. In 105 of the 113 without hypertension the main renal arteries exhibited no lesions and in 8 atheromatous plaques were present. It is suggested that atheromatous plaques may be capable of producing renal ischaemia and consequent hypertension analogous to experimental hypertension.

Renal Tuberculosis.—S. Suter⁵ has investigated 260 cases of renal tuberculosis to determine the duration of the disease and certain other problems. In 73 cases there was evidence of a previous primary tuberculous lesion. The interval between the two manifestations varies greatly but does not exceed 10 years. When the patient comes under observation the symptoms of uro-genital tuberculosis can generally be traced for a previous 18 months. In the 187 cases in which renal tuberculosis was the first manifestation the previous symptoms can usually be traced for about 2 years. When renal tuberculosis is associated or preceded by tuberculosis of the prostate or epididymis there is usually an interval which may be of several years' duration between the two lesions.

Treatment of Œdema.—H. J. Lehnhoff and M. W. Binger⁶ (Rochester, Minn.), in a communication on the treatment of œdema of renal origin, bring further evidence in support of the use of *acacia*. The patient receives a minimum of 3 intravenous injections of 500 c.c. of a 6 per cent solution of pure *acacia* in a 0.06 per cent solution of sodium chloride at intervals of 1 to 2 days. The concentration of *acacia* in the serum was determined one day after the last injection. If the concentration of *acacia* was 2 g. per 100 c.c. of serum, further treatment with *acacia* was not employed. Otherwise the administration of *acacia* was continued not only until the patient was free from œdema but until the concentration of *acacia* in the serum reached a satisfactory level. [It is noticeable that the Mayo Clinic with its large experience adheres to the use of *acacia*, which has been abandoned in this country after considerable experience.—H. L. T.]

REFERENCES.—¹*Acta med. scand.* 1943, 113, 217; ²*Arch. intern. Med.* 1943, 71, 675; ³*J. Urol.* 1943, 49, 79; ⁴*J. Path. Bact.* 1943, 55, 33; ⁵*Schwartz. med. Wschr.* 1942, 72, 885; ⁶*J. Amer. med. Ass.* 1943, 121, 1321.

RESUSCITATION OF THE APPARENTLY DROWNED.

Lambert Rogers, M.Sc., F.R.C.S.

Resuscitation of the apparently drowned necessitates attention to three factors: pulmonary ventilation, the restoration of an efficient circulation, and the provision of warmth. The methods of carrying out artificial respiration have been called in question recently in correspondence in the weekly medical press. All methods must fulfil the following criteria: (1) effect ample pulmonary ventilation, (2) stimulate the heart and circulation to assist oxygen transport and the respiratory exchange, and (3) be harmless in themselves, easy of execution, and rapid in attaining results. Until 1932 the two best known and widely practised methods of artificial respiration were Schafer's and Silvester's.

D. G. Cordier¹ reminds us that the British Suspended Animation Committee of 1903 decided that Silvester's method produced greater pulmonary ventilation than Schafer's. *Eve's rocking method* which has been brought much to the fore recently, however, is claimed to be better than either. It is becoming popular at sea and was first used on board one of H.M. ships in 1933. It has gained the approval of the Medical Research Council.² Cordier, however, believes, that further experimental work is necessary before it can be concluded that the rocking method is actually superior to the older methods in producing greater ventilation, and points out that it has the disadvantage of requiring apparatus for its application. This apparatus can, however, be easily improvised—any flat board and some form of fulcrum on which to rock it—and G. H. Gibbens³ has shown how an army type stretcher slung from hammock hooks may be used on board ship. Sir Leonard Hill⁴ advocates Eve's method and states—"in my opinion rocking is the best method of doing artificial respiration, can do no

violence, and is easy to carry on for a long period, while the lost tone of the diaphragm makes no difference to its efficiency. My experiments on the influence of gravity on the circulation showed how the blood-flow to the brain can be kept going by the head up and head down position advocated."

In a recent paper entitled "complacency in resuscitation of the drowned" F. C. Eve⁵ puts forward the claims of this method. "A dozen times a minute the patient (lashed to a stretcher) is rocked face downwards, through a total angle of 60° to 90° on a pivot—provided either by a trestle or by a rope from hammock hooks passed under the middle of the stretcher. On this see-saw the weight of the abdominal contents pushes and pulls the diaphragm alternately up and down by a piston action which is actuated by gravity and does not depend on elastic recoil for inspiration."

Eve points out that drowning cases always suffer from shock, so that in the U.S. Army they are resuscitated in the head-down position—say 10°. He instances the value of reinforcing rocking by a jerk whereby the momentum of the moving viscera and blood columns is valuably enhanced. When diaphragmatic tone is lost Schafer's method is impotent because the elastic recoil of the diaphragm to produce inspiration has gone. At this stage Silvester's method will still produce some ventilation owing to the elasticity of the thoracic cage, but the rocking method will most effectively move the flaccid diaphragm to and fro.

[It is advisable, therefore, to start Schafer's method instantly, and, if ventilation is satisfactory, to persevere, but if not, Silvester's method should be tried and/or rocking instituted as soon as the apparatus can be made ready.—L. C. R.]

REFERENCES.—¹*Brit. med. J.* 1943, 2, 381; ²*Spec. Rep. Ser. med. Res. Coun., London*, No. 237, 1939; ³*Brit. Med. J.* 1942, 2, 751; ⁴*R.N. med. Bull.* 1943, 5, 27; ⁵*Brit. Med. J.* 1943, 1, 535.

RETINA, AFFECTIONS OF.

Sir Stewart Duke-Elder, M.D., F.R.C.S.

Thrombosis of Central Vein.—That thrombosis of the central vein of the retina usually carries a bad prognosis and frequently leads to intractable glaucoma is well known. In 1938 N. Holmin and K. G. Ploman¹ reported the first case treated by intravenous injections of *heparin*; vision was restored to 6/6 in two months. In 1941 R. L. Rea² reported 5 cases: in 3 there was complete occlusion of the trunk, and in 2 occlusion of a branch. In 1 case of complete thrombosis, treatment was entirely ineffective and the eye became blind. Of the other 2 cases an unspecified amount of improvement occurred in 1, and in the other vision rose from 2/60 to 6/24. In the 2 cases of branch thrombosis complete cure resulted, the vision returning to 6/6. All these cases were treated at an early stage. A paper has now appeared by C. M. Rosenthal and J. T. Guzek³ in which 2 cases are presented. In the first one five weeks elapsed between the occurrence of the thrombosis of the central retinal vein and the beginning of the treatment with *heparin*. In the second case three weeks elapsed. In both cases vision of 6/6 was finally obtained.

In the first case the first dose of *heparin* was 20 c.c. in 1000 c.c. of 5 per cent dextrose in saline solution, and four hours after completion of this injection 10 c.c. in 500 c.c. of saline solution was given for two doses (10 c.c. contains 100 mg. of the purified sodium salt of *heparin*). The coagulation time was tested by the capillary method regularly four hours after each injection throughout the treatment. It now varied between twenty-two and forty minutes. The dose was reduced to 5 c.c., and the *heparin* was given undiluted directly into the vein at 4 to 4½ hour intervals for fourteen injections. The coagulation time four hours after each injection varied from seven to nineteen minutes. After this the dose was decreased to 4 c.c. every five hours, to 3 c.c. every six hours, to 2 c.c. every six hours, and finally to 2 c.c. every eight hours. A total of 180 c.c. of *heparin* was given in ten days by this intermittent intravenous method.

In the second case 200 mg. of *heparin* in the form of undiluted solution of the purified sodium salt was given intravenously. On the following day 125 mg. was given in the morning and in the evening. However, the patient afterward had severe bleeding from a socket from which the tooth had just been extracted. This compelled the authors to withhold the treatment until 5 days later, when it was resumed. The *heparin* was then given for four days, 125 mg. in the morning and in the evening. Thus, a total of 250 mg. of *heparin* was given each day for six days.

These results would seem to indicate that thrombosis of long standing is also amenable to treatment. The reason is difficult to understand. The authors think that the heparin prevents further increase in the thrombotic process, thus permitting greater canalization and resumption of the normal function of the vein.

In a further paper Bertha A. Klien⁴ suggests restrictions for the type of case to which heparin should be given. She divides thrombosis of the retinal vein into 4 types: (1) Thrombosis due to occlusion by compression, as occurs commonly in arteriosclerosis when the adjacent artery compresses the vein, or more rarely in tumours of the optic nerve. In these conditions anti-coagulant therapy is of little or no value, as thrombus formation is only the terminal event bringing about complete occlusion of an already narrow venous aperture. (2) Primary thrombus formation in blood dyscrasias, such as polycythæmia and thrombocythæmia. Heparin therapy is of definite value in such cases, as illustrated by a report on a patient with incipient occlusion of the central vein in one eye who was thrice treated successfully with anti-coagulants. (3) Occlusion by stagnation thrombosis following widespread arterial spasm. To this type belongs venous occlusion caused by early spastic hypertension. Anti-coagulants, perhaps supported by vasodilators, should be of definite value in the treatment of this type. (4) The fourth type of retinal venous occlusion is that caused by inflammatory disease of the venous wall, which leads to complete occlusion of the venous lumen by secondary thrombus formation. The most frequent example is tuberculous retinal periphlebitis. The alterations of the venous walls in this condition may consist either of non-specific proliferative inflammatory changes on an allergic basis, beginning with a round-cell infiltration in the perivascular lymph space, which gradually encroaches on and destroys the venous walls, or, in rarer instances, of real tuberculous granulation tissue, which may project as a nodule into the venous lumen. In either event the end-result is an extreme narrowing of the venous lumen at a place where the venous walls are maximally diseased, and the secondary thrombus formation in such places, whether in the central vein or in one of its branches, serves to diminish rather than to increase the hæmorrhagic extravasations. Anti-coagulants, therefore, are contra-indicated.

Hypertensive Vascular Disease in the Fundus Oculi.—During recent years a considerable literature has accumulated on the retinal appearances in essential hypertension. Martin Cohen⁵ of New York in a useful paper summarizes, with clinical examples, his conclusions on this important subject. It is undoubted that an ophthalmoscopic examination is an invaluable aid in the diagnosis and prognosis of hypertensive vascular disease, as it provides a visible guide to the condition of the general vasculature such as cannot be observed in any other organ or tissue of the body; but it is difficult to define the transition of fundus lesions from one form into another. The following classification is suggested by Cohen:—

Essential Benign Hypertension.—The papilla may be somewhat hyperæmic, with its margins sharply outlined. The arterioles frequently are contracted and tortuous, and their lumens show a prominence of their central light reflex. The venules are slightly dilated and congested, and where they are crossed by sclerosed arterioles they are compressed and deflected. This change occurs mainly on the superior or inferior temporal vein. A few hæmorrhages or glistening whitish plaques may appear near the posterior pole of the eye. The changes are few and slight, and the fundus may appear normal, or the picture may resemble that seen in arteriosclerosis. The diagnosis based on the fundus changes may be benign hypertensive retinopathy or benign hypertensive retinal arteriolar sclerosis.

Malignant Hypertension.—The fundus shows characteristic early and late manifestations. These changes are diversified, comprising moderate and severe lesions of arteriolar sclerosis, hæmorrhages, exudates, and cedema. They are located mainly at or near the posterior pole of the eye. The fundus lesions are classified as follows:

Moderate form: The arterioles are contracted, their central light reflex is prominent, and they pursue a tortuous course. There is moderate venous hyperæmia, with compression and deflection of the veins where they are crossed by sclerosed arterioles; moderate cedema of the disc and surrounding areas; numerous hæmorrhages, small and large; white lines bordering the arterioles and venules; beading of the arterioles and at times silver-wire vessels; and rarely a partial star figure in the macular area. The diagnosis based on the fundus picture may be malignant hypertensive neuroretinopathy or malignant hypertensive retinopathy.

Severe form: There is a progression of the moderate lesions associated with pronounced papilloedema or choked disc, large cedematous areas in the perimacular region, and occasionally a complete star figure in the macula. Some arterioles appear as white cords, owing to endarteritis. Detachment of the retina and choroid, hæmorrhages into the vitreous, and pigment spots are rarely present. The severe form signifies the terminal phase of malignant hypertension. The diagnosis based on the fundus picture may be malignant hypertensive retinopathy with papilloedema.

REFERENCES.—¹*Lancet*, 1938, 1, 664; ²*Arch. Ophthalm.* 1941, 25, 548; ³*Ibid.* 1943, 30, 282; ⁴*Ibid.* 29, 699; ⁵*Ibid.* 85.

RHEUMATOID ARTHRITIS.

A. H. Douthwaite, M.D., F.R.C.P.

Developments in the treatment of this disease have been largely in the direction of discarding therapy based on the unproven assertion that it is due to any known microbe and that it can be appreciably checked by the elimination of focal sepsis and inoculation with vaccines. Although it has been stressed for years by those qualified to speak that focal sepsis is often the result of a general disease rather than the cause, the recognition of this fact has been tardy. The waning of the focal sepsis theory is largely attributable to the advent of the remarkably successful use of *gold* to which detailed references have been made in earlier editions of the MEDICAL ANNUAL.

The main causes of the distrust with which chrysotherapy is still regarded by many practitioners and by the public are:—

1. Its use on unsuitable cases, e.g.: quiescent disease with residual deformity; chronic rheumatism not of the rheumatoid variety.

2. Toxic reactions. It must be admitted that these are not always avoidable, but the incidence can be greatly diminished by restricting the total course-dosage to not more than 1 g. A scheme which is usually effective is to give an intramuscular injection of an oily suspension (the aqueous preparations of sodium aurothiomalate are absorbed too quickly and produce toxic reactions) once a week—6 doses of 0.02 g., followed by 10 doses of 0.05 g. If the E.S.R. is still above normal two doses of 0.1 g. may be given. In our 1943 edition it was noted that experimental work on animals and later on patients showed that *calcium aurothiomalate* was a hundred times less toxic than the sodium salt. Some confirmation of this view is supplied by M. B. Ray,¹ who has used a finely divided aqueous suspension of calcium aurothiomalate containing 0.05 g. per c.c. The salt contains 51.3 per cent of gold and is insoluble in water and not rapidly absorbed. He treated 50 cases with 12 weekly injections of 0.05 g., thus giving a course-dosage of 0.6 g. Ray reports that 50 per cent showed clinical and E.S.R. improvement; 25 per cent some improvement;

and 12 per cent no change. These figures are not so good as have been attained with the sodium preparation, but this comparison is not quite just because the author deliberately included some non-rheumatoid arthritics in the series and his full course was possibly too small. Apart from transient skin irritation in 10 cases no untoward effects were observed. The fact that the simultaneous administration of calcium gluconate with sodium aurothiomalate appears to reduce the toxicity of the latter is attributed to the formation of the calcium gold compound in the tissues.

3. The failure to realize that as a rule at least four courses of gold must be given in two years to prevent relapse.

4. Carelessness in looking out for early signs of toxic reactions, or failure to interrupt the course if they are observed.

Felty's Syndrome.—R. H. Talkov, W. Bauer, and C. L. Short² discuss the occurrence of splenomegaly, leucopenia, and polyarthritis, to which the above title has been given since Felty reported on 5 cases. They rightly deprecate the use of an eponym to describe a not very uncommon variant of rheumatoid arthritis. Many rheumatoid arthritics, especially if young adults and in an active stage, will be found to have enlarged spleen and lymph-glands. It is largely a matter of how carefully one searches for these signs. There is only a difference of degree of lymphoid reaction to separate Still's disease in infants from the rheumatoid arthritis of adults. Coates and Delicati stated that splenomegaly was present in 21 per cent of their patients, and enlarged glands in 53 per cent, whilst Waterhouse recorded adenopathy in 96 per cent. A striking leucopenia is rare, but counts of 5000 per c.c. are common. One must always remember the possibility of amidopyrine or even sulphonamides having been used when faced with a low white-cell count in chronic arthritis. In the authors' 293 cases splenic enlargement was noted in 7 per cent, lymphatic enlargement in 31 per cent, and a leucocyte count below 5000 in 1 per cent.

REFERENCES.—¹*Practitioner*, 1943, 110, 49; ²*New Engl. J. Med.* 1942, 227, 395.

SANDFLY FEVER. *Sir Philip Manson-Bahr, C.M.G., D.S.O., M.D., F.R.C.P.*

Recent indications are to the effect that sandfly fever is a much more serious disease than formerly considered. Changes in tension and composition of the cerebrospinal fluid have been described, and now J. C. Shee¹ has found choking of the optic discs in 27 out of 30 cases, but in mild cases it was absent. The condition varied from blurring of the edges of the discs with distension of retinal veins to papilloedema with swelling of 2 to 2.5 D. It was seen in the earliest stages, in one six hours after onset, but sometimes it was more pronounced on the second day. In severe cases it was still visible on the day after the crisis. This phenomenon was regarded as due to increased pressure in the cerebrospinal fluid. This sign is claimed as being of assistance in diagnosis.

REFERENCE.—¹*Indian med. Gaz.* 1942, 77, 732.

SCIATICA. (*See INTERVERTEBRAL DISCS, RUPTURED; LOW BACK PAIN AND SCIATICA.*)

SEMINAL VESICLES, SURGERY OF.

Hamilton Bailey, F.R.C.S.

Hyperplasia of a Seminal Vesicle Simulating Prostatic Enlargement.—J. T. Chesterman¹ encountered 2 cases of retention of urine, suspected to be due to enlargement of the prostate, but it was later proved that the obstructing agent was not the prostate but hyperplasia of a seminal vesicle. His observations are important. As he has encountered two cases, this condition cannot be excessively rare, and possibly hyperplasia of a vesicle has been mistaken for an anomalous adenoma of the prostate.

Tuberculous Seminal Vesiculitis.—A. H. Greenberger² finds seminal *vesiculography* valuable in the diagnosis of tuberculosis of the seminal vesicles. The same author says perineal prostatectomy is the only cure for the tuberculous prostate. It prevents prostatic fistula and it provides a means of removing a common and serious focus of the disease.

HæmospERMIA.—G. Parker³ confirms that the most frequent causes of hæmospERMIA are, in order of frequency: (1) Gross masturbation or sexual excess; (2) Tuberculous seminal vesiculitis; (3) Acute seminal vesiculitis, irrespective of cause or organisms; (4) Mechanical urethral obstruction.

REFERENCES.—¹*Brit. J. Urol.* 1942, 14, 174; ²*Quart. Bull. Sea View Hosp.* 1942, 7, 123; ³*Proc. R. Soc. Med.* 1942, 35, 659.

SEX HORMONES.

Sir Walter Langdon-Brown, M.D., D.Sc., F.R.C.P.

Samuel Leonard Simpson, M.A., M.D., F.R.C.P.

Sex Hormones and Intersexuality.—A. P. Cawadias¹ recommends dropping the labels of hermaphroditism and pseudohermaphroditism as too involved in mythological associations, and prefers that of intersex, which he defines as a morbid exaggeration of a normal process. He gives a useful classification of intersexuality, though there are varying degrees of overlap: (1) The *gonadal*, in which the normal balance of the male and female elements in the gonads is upset. A virilizing tumour of the ovary is an example. (2) The *genital*, in which there is a variable amount of malformation of the external and internal generative organs, which are normally moulded from a plan common to both under the organizing influence of the genes. This type then is due to an embryological fault. (3) The *morphological*, in which the general bodily conformation and secondary sexual characters resemble that of the opposite sex. This may be powerfully affected through the endocrine system; thus cortical adrenal tumours may produce virilism in women. The excretion of androgens and oestrogens by both sexes, though in different amounts, proves the existence normally of a bisexual basis which may be upset. (4) The *psychological*, affecting temperament and emotion, which may be influenced by environment. He considers that the monstrous deviations, which are rare, are useful principally for the understanding they afford of the very frequent milder forms.

Testosterone Propionate Pellet Implantation in Gynæcological Disorders.—R. B. Greenblatt² advocates the implantation in the subcutaneous tissue of the abdomen of pellets of testosterone propionate in various gynæcological disorders: 1 to 4 pellets were implanted, each weighing 20 to 200 mg. The largest total dosage was 400 mg.; 8 patients with severe functional menometrorrhagia all benefited. In 5 patients cystic glandular hyperplasia of the endometrium was known to be present, and in 3 of these cases it was ascertained that this persisted in spite of a return to apparently normal menstruation. In menorrhagia associated with fibroids the result of testosterone is variable and may be nil; in some cases it proved a useful measure of control prior to operation. Uterine fibroids decreased in size with testosterone therapy. Women with menopausal symptoms (8) were successfully treated. In 50 per cent of patients suffering from severe dysmenorrhœa, relief was obtained. Nocturia was benefited or abolished. Libido was generally increased, but no such result was obtained in 2 psychologically frigid women. In only one case was there evidence of suppression of ovarian activity as judged by endometrial biopsy. No evidence of virilization was obtained with the dosage used. Incidental findings were an increase in weight, amelioration of menstrual migraine, decrease of premenstrual mastalgia, and lumpiness of the breast.

REFERENCES.—¹*Hermaphroditos*, 1943, Heinemann; ²*J. Amer. med. Ass.* 1943, 121, 17.

SKIN, CONGENITAL HÆMANGIOMATA OF.*Sir John Fraser, M.Ch., F.R.C.S.Ed.*

Congenital hæmangiomata of the skin are frequently encountered. Sometimes they grow to disconcerting proportions, and, when they occur on the face or other exposed parts, they are ugly blemishes. There are many varieties. According to Watson and McCarthy¹ the following is an inclusive classification: (1) Capillary; (2) Cavernous; (3) Hypertrophic; (4) Racemose; (5) Diffuse systemic; (6) Metastasizing; (7) Nævus venosus or port-wine stain; (8) Hereditary hæmorrhagic telangiectasis.

The capillary and cavernous types are those most commonly encountered; it is estimated that they constitute 95 per cent of the error, and this is fortunate, because they are usually small and localized; on the other hand, the site of their occurrence is the head and neck, where cosmetic effects and the results of treatment are important.

Many forms of treatment have been employed—surgical excision, the application of carbon dioxide snow, the injection of sclerosing solutions, destruction



*Fig. 27.—Treatment of congenital hæmangiomata of the skin by radon seeds.
a, Before treatment; b, After treatment. (Reproduced from the 'Annals of Surgery'.)*

by cauterization or desiccation, and radiotherapy. Varying degrees of success have attended the different measures, the ideal being complete elimination with the minimum of scar. There is general agreement that in the common capillary and cavernous types some form of radiation therapy produces the best results, and, according to Johnson and Light,² the introduction of radon seeds is the most satisfactory. The technique employed is to use one radon seed (0.25 to 1.0 millicurie) for each cubic centimetre of tissue, the amount of radon per seed depending on the size and location of the tumour; but care should be taken to use small doses, particularly in the cavernous types, where the tendency to sloughing is considerable. If one may judge by the photographs which accompany the report, the cosmetic effects are excellent (*Fig. 27*).

REFERENCES.—¹*Surg. Gynec. Obstet.* 1940, **71**, 569; ²*Ann. Surg.* 1943, **117**, 134.

SKIN DISEASES. (See CHEESE ITCH; IMPETIGO CONTAGIOSA; INDUSTRIAL DERMATITIS; INFESTATION AND INTELIGENCE; SKIN, CONGENITAL HÆMANGIOMATA OF; VITAMINS AND DISORDERS OF THE SKIN; WARTS.)

SMALL-POX AND VACCINATION.

H. Stanley Banks, M.A., M.D., M.R.C.P., D.P.H.

Epidemiology.—In 1942 there were 7 cases notified as small-pox in England and Wales and no deaths.¹

Sulphanilamide Treatment.—S. G. Vengsarker et al.² attempt a statistical evaluation of the effect of sulphanilamide in treatment. The investigation seemed to show that sulphanilamide reduced the mortality in confluent and semi-confluent cases, especially if administered early in the disease, and that complications were fewer and the pustular stage shorter.

Vaccination in the Glasgow Outbreak.—G. Buchanan and S. Laidlaw³ give an account of 1000 vaccinations in dock workers. A severe reaction occurred in 12 per cent, normal in 72 per cent, immune reaction in 10 per cent, and no reaction in 6 per cent. The latter (58 cases) were all re-vaccinated, when only 2 showed an immune reaction. Less than 3 per cent of all classes of workers were off work on account of vaccination. A good previous vaccination scar was no guarantee of immunity. Stout persons, elderly persons, and women had an undue proportion of severe reactions. Vaccination of the lower limbs caused much more discomfort than vaccination of the upper limbs. Many suffered from coryza and even sore throat from the 8th to 11th day of vaccination. A rash, urticarial, morbilliform, or scarlatiniform, developed between the 9th and 10th day in 9 cases. It disappeared in 2 days and did not in any case become pustular.

Post-vaccinal Eruptions.—E. Bloch⁴ describes 123 regional or generalized post-vaccinal rashes resulting from half a million vaccinations in Glasgow in July 1942; the majority appeared 7 to 11 days after well-marked primary vaccination of children. Of 98 erythematous or urticarial eruptions, 37 were papular urticaria, 20 were pleomorphic types of erythema multiforme, 16 morbilliform, and 6 scarlatiniform rashes. There were 9 cases of bullous impetigo of regional distribution, simulating multiple auto-inoculations. No case was classified generalized vaccinia. There was no incrimination of any particular batch of lymph. The view is accepted that these rashes were due either to septic infection of the skin or to sensitivity of the skin to septic products absorbed from the vaccine pustule.

A. A. Jubb⁵ of the Ministry of Health discusses *generalized vaccinia* in a comprehensive article. This is a rare complication with an incidence in England and Wales of little more than 1 in 100,000 vaccinations and a mortality of 1·2 per million vaccinations. It is exceedingly rare in adults; it nearly always affects children, and only those vaccinated for the first time. It is due to an abnormally low natural immunity to the virus of vaccinia. Generalized vaccinia must be distinguished from the much commoner post-vaccinal rashes usually described as macular, papular, pustular, punctate, erythematous, morbilliform, urticarial, roseolar, or eczematous. These have an incidence as high as 1 in 4000 vaccinations.⁴ Generalized vaccinia appears commonly from the 9th to the 14th day, but may be as early as the 4th or as late as the 23rd day after vaccination. It usually appears as a single crop of papules which mature into vesicles, pustules, and crusts; occasionally there are successive crops up to 5 or 6 weeks. The elements of the rash may appear in any part of the skin or in the mouth, and in contradistinction to those of small-pox, show much diversity in size. The following points are important in diagnosis: (1) Auto-inoculation must be excluded; (2) The date and appearance is not earlier than the 4th and seldom earlier than the 9th day after vaccination; (3) The eruption must be elsewhere than in the neighbourhood of the vaccination site; (4) There must be a vesicular stage. Treatment, as suggested by Mervyn Gordon,⁶ is by local application of *permanganate of potash* solution, which even in a strength of 1 in

100,000 is virucidal. Serum from a recently vaccinated person may also be tried.

A post-vaccinal eruption of special interest is *eczema vaccinatum*. It occurs in vaccinated persons with a history of eczema or in children suffering from eczema who are in familial contact with, and presumably infected by, a vaccinated person. On the eczematous site, vaccinia-like vesicles appear, and later these spread to healthy areas of the skin. This condition appears to be the same as that known as "Kaposi's varicelliform eruption".

L. S. P. Davidson and L. J. Davis⁷ describe 4 instances of post-vaccinal eruption, which may have been associated with a state of allergy. One case, an asthmatic, had a generalized papulo-vesicular eruption; in two others some of the papules were hæmorrhagic; the fourth, a sufferer from recurrent purpura, had severe epistaxis and petechial hæmorrhages. It is suggested that these abnormal reactions may have been related to an allergic tendency.

Intradermal Method of Vaccination.—E. R. Peirce and H. Willoughby⁸ vaccinated 854 service personnel by the intradermal method. A small drop of lymph taken up in the eye of a sterile darning needle was dropped on the skin, and the point of a sterile triangular surgical needle was passed through the drop for a distance of $\frac{1}{16}$ in. parallel to the skin surface intra-epidermally. No dressing was required. The method economized lymph and dressings. Reactions were classified as "successful" (exactly like normal 'takes' in scarified vaccinations), "vaccinoid" (mild 'takes'), or "immune" (irritation and areola within 24 to 48 hours). Immune reactions appeared in 77.6 per cent of those vaccinated within the previous five years, and in as many as 48.6 per cent of those last vaccinated between 15 and 20 years previously. The latter figure, as the authors remark, was a matter for surprise.

REFERENCES.—¹*Summary Rep. Min. Hlth.* 1943, 47, 48; ²*J. Indian med. Ass.* 1942, 11, 361; ³*Brit. med. J.* 1942, 2, 394; ⁴*Lancet*, 1942, 2, 504; ⁵*Brit. med. J.* 1943, 1, 91; ⁶*Ibid.* 1941, 2, 822; ⁷*Lancet*, 1943, 2, 103; ⁸*J. R. nav. med. Serv.* 1943, 29, 125.

SOCIAL ASPECTS OF PSYCHIATRY, INCLUDING DELINQUENCY.

Aubrey Lewis, M.D., F.R.C.P.

The effect of bombing upon the civilian population was the object of a thorough survey by R. Fraser, I. M. Leslie, and D. Phelps.¹ Detailed figures of the extent of neurotic disturbance in those admitted to First Aid Posts in a heavily bombed English city are reported: 66 per cent of those who had been buried for more than one hour developed neurotic symptoms, and in 40 per cent the resulting neurosis had caused absence from work temporarily or during the ensuing 10 months. The commonest disturbance was a mixture of depression and anxiety; hysterical disturbance occurred in 16 per cent. Slightly more than half of the persons in question had neither left the town nor moved permanently to a safer area of the city. Neurosis is likely to follow severe personal air-raid experiences which at the time upset the individual emotionally or seriously disturb his way of life, especially if he is of unstable personality and had, at the time of the air raid, other distressing problems. The neurotic effects of bombing are least likely to persist if full normal life is resumed as early as possible; those who have lost confidence do better if they move to a less dangerous area.

J. Whitby² found among 8000 attendances in a general practice during the second and third years of war that there was a small but definite increase in nervous symptoms during the air raids of September, October, and November, 1940, but thereafter the incidence fell to normal; 75 per cent of all those seen had previously exhibited predisposition to neurotic illness. The exact figures given by Whitby indicate that the incidence of mild neurosis during the second

and third years of the war was low in the general population of a large London district.

H. E. Collier³ has used a somewhat different material to ascertain the incidence of neurotic illness. He concludes that about 280 per thousand of all cases of unduly prolonged disablement are due to, or associated with, manifest psychiatric disorder, or that of every 1000 disabled persons about 280 will be disabled for a long time because of psychiatric disorder. The incidence of nervous illness is higher among women than among men (320:246), the excess being confined chiefly to single women. Of the patients summoned for examination in connection with their insurance benefit, at least 14 per cent were estimated to be neurotic; actually of those seen 28 per cent were neurotic, but only 50 per cent of those summoned presented themselves; 3.8 per thousand of the population at risk had a long disablement caused by neurosis, and a further calculation suggests that 1.2 per thousand of the insured population suffer from disabling neurosis each year.

In order to discover what is the *medical and social history of soldiers discharged on account of neurosis*, 120 such men were followed up by means of personal visits to their homes, 6½ months or more after they had left the Army. A. J. Lewis,⁴ reporting the findings, indicates that nearly half the men were earning less than they had before enlistment, and that of the 105 in employment 44 were doing only light or desultory work, and a number of them were socially unsatisfactory, apart from their occupations; they were either delinquent or unduly quarrelsome. There was evidence that since the inquiry had been made, there had been improvement in the social and medical status of neurotic ex-service men, which must be attributed partly to an improved arrangement for finding them suitable work.

E. Guttman's⁵ investigation into the *social effects of accidental injury to the head* was based on 300 consecutive admissions, of whom 4 per cent had died. The average working-time lost by wage earners was roughly eight weeks. In those who stayed off work for an unusually long time, social and psychological factors were responsible for this invalidism rather than any physical effects, except in those few who had had such severe cerebral damage that they were largely incapacitated thereby. Guttman emphasizes that the social prognosis is not identical with the medical one; patients may still have symptoms yet be suitable for return to work. He stresses the need for psychological management of head injury cases in the early stages, and for facilities for psychological treatment and social after-care during convalescence and later.

Stanley Cobb and E. Lindemann⁶ have made an interesting review of the *need for psychiatric assistance in an accident ward*. [Apparently all the patients in the ward they studied had been admitted as victims of the recent Cocoanut Grove catastrophe in Boston, in which many people were burnt or crushed to death.] They were called in because a severe attack of excitement and suspicion had developed in a woman when she learnt, after her confusion had cleared up, that her husband and son had been killed in the disaster. A need for psychiatric supervision or treatment was found in 14 patients in the ward, which contained 32 survivors. Cobb and Lindemann consider that there should be a psychiatric examination of all the patients after such a disaster and that those who continue emotionally disturbed should have psychiatric care and later aid in adjusting to ordinary life, especially if they have been bereaved.

The possibility of treating psychiatric patients in the wards of a general hospital has been examined by D. E. Sands.⁷ Of 281 such patients three-quarters were able to return to work after six weeks in hospital, on the average. When they were investigated later, only 5 per cent had relapsed. Sands draws attention

to the possibilities, both financial and social, which would arise from an extension of this way of dealing with suitable psychiatric cases.

The late A. A. Rosanoff⁸ describes the conclusions arrived at in the *examination of 30 men found guilty of murder* whom he had examined during the last 3½ years. In 13 of them a history was elicited of previous major crimes which had remained undetected and unrecorded. Theft, burglary, and robbery were common. In contrast, there was a group of 12 men who were in the main of non-criminal personality but who had a sense of injustice and emotionally unstable temperament. Alcohol was a factor in 10 cases; if it had not been for alcohol the crime would probably not have been committed; 5 had suicidal intentions or made suicidal attempts. Rosanoff considered that the men who had a career of criminality could have been readily diagnosed in their teens as defective or psychopathic delinquents, often because of damage to the brain in early life. He was in favour of segregating these recidivists in special institutions for psychiatric care and close supervision, as well as for secure custody, thus averting the major catastrophes that occurred in this group.

Among the many papers on *electro-encephalography*, the abnormal findings in *psychopathic personality and delinquency* have been prominent. Since H. H. Jasper⁹ noted the abnormality in maladjusted children, several investigators¹⁰ have confirmed and expanded his observations. D. Silverman¹¹ has recently examined 75 criminal psychopaths by this method, and found that 80 per cent gave abnormal or suspicious tracings. He concludes that psychopathic personality is a mental illness due to inborn, or early acquired, cerebral dysfunction, and disturbed relationship between child and parent.

A. Myerson¹² draws attention to the *dangers of artificial insemination*, when undertaken without due inquiry and regard for psychiatric and genetic considerations. He reports the case of a woman who after ten years' marriage had remained *virgo intacta*. At her husband's wish she was then inseminated, and eventually bore a child. She became obviously insane after the confinement, and it was clear that her avoidance of intercourse had been the outcome of a long-standing mental disorder of hereditary type, characterized by morbid notions about intercourse. It had been thought that the pregnancy and parenthood would benefit her abnormal state of mind. Myerson comments acidly on the still widespread belief among doctors, as among the public, that mental disturbances, neuroses and so forth, can be improved by pregnancy and childbirth; the contrary is rather the case.

REFERENCES.—¹*Proc. R. Soc. Med.* 1943, 36, 119; ²*Ibid.* 123; ³*Brit. med. Jour.* 1943, 2, 461; ⁴*Lancet*, 1943, 1, 167; ⁵*Brit. med. J.* 1943, 1, 94; ⁶*Ann. Surg.* 1943, 117, 814; ⁷*Brit. med. J.* 1943, 1, 628; ⁸*Amer. J. Psychiat.* 1943, 1, 484; ⁹*Ibid.* 1938, 95, 641; ¹⁰*Psychosomat. Med.* 1942, 4, 134, *Amer. J. Psychiat.* 1942, 98, 499, and *J. Neurol. Psychiat.* 1942, 5, 47; ¹¹*Arch. Neurol. Psychiat.* 1943, 50, 18; ¹²*Amer. J. Psychiat.* 1943, 100, 285.

SPASTIC CHILDREN.

Reginald Miller, M.D., F.R.C.P.

While making allowance for the other disabilities from which children with cerebral palsies are prone to suffer, it can hardly be denied that the muscular rigidity in itself may be a severe handicap and limit the amount of improvement in function which might be obtained from training. Thus to be able to lessen the spasticity might be hoped to lead to improved results in rehabilitation.

Curare Treatment.—Curare is an arrow poison of the South American Indians, and its power of causing paralysis of skeletal muscles has been known since Sir Walter Raleigh introduced the drug into Europe in the sixteenth century. In 1865 Claude Bernard¹ reported that the site of its paralytic action was at the myoneural junction. In 1938 large amounts of the drug were brought back by R. C. Gill,² and since then progress has been made in preparing and standardizing it for clinical use. In that year M. S. Burman^{3, 4} attempted to control

the muscular rigidity of spastic children by its use and obtained some encouraging results.

After studying the scattered reports from various authors amounting to about 20 cases, E. Denhoff and C. Bradley⁵ have attempted to standardize the details of the treatment and to assess its value in 6 cases under continuous observation. Curare is ineffective when given by mouth, and the authors obtained their best results by intramuscular injection. They found that, given in full doses, the effect lasted 3 or 4 days, thus reducing the frequency of the injections to twice a week. The preparation used was a physiologically standardized extract sold under the name of 'Intocostrin', 1 c.c. of the solution containing the equivalent of 20 mg. of a standard curare. The initial dose given intramuscularly was 5 c.c., and this was increased with fair rapidity until transient paralytic signs followed the injection: the optimum maintenance dose was taken to be 4 to 8 mg. below this level. The authors have no hesitation in claiming that notable improvement in muscular performance occurs under the exhibition of full doses of curare. In one instance a girl was able to run upstairs for the first time in her life; in another a boy could make limited use of an arm which had hitherto always been carried across his chest. *Amphetamine sulphate* (*benzedrine*) was also given for a time in all six cases. In four this led to an increase in energy and so to improved motor performance, but in the other two it did harm by causing increased irritability and mental distraction.

Quinine methochloride, a synthetic drug, which is said to have a curare-like action when given by mouth, was given by E. Press⁶ to the same series of cases of cerebral palsy as had been treated by Denhoff and Bradley. He was unable to reproduce the good effects of curare in any of them.

REFERENCES.—¹*Bull. gen. Ther., Paris*, 1865, 69, 23; ²*White Waters and Black Magic*, 1940, New York; ³*J. Bone Jt. Surg.*, 1938, 20, 754; ⁴*Arch. Neurol. Psychiat.* 1939, 41, 307; ⁵*New Engl. J. Med.* 1942, 226, 411; ⁶*Ibid.* 227, 475.

SPINA BIFIDA.

Sir John Fraser, M.Ch., F.R.C.S.Ed.

The various aspects of spina bifida are discussed by F. D. Ingraham and H. Swan¹ in a series of three articles published in the *New England Journal of Medicine*. The study is based on a review of 546 cases, and, as might be anticipated, the large amount of clinical material provided examples of all the recognized types of the disorder. In general the publication deals with features which are recognized and accepted, but there are certain points of interest which call for comment.

The authors suggest that the classification terminology should be extended to include what they term "lipomeningoceles and lipomyelomeningoceles". The recommendation is based upon the observation that collections of fatty tissue are so frequently encountered in association with spina bifida. It is doubtful if the point has any real significance, and it seems inadvisable to burden an already complicated terminology with terms which have no real bearing upon the clinical or pathological aspects of the disease.

In the discussion on the clinical aspects attention is drawn to the relationship between spina bifida occulta and entities dependent upon errors in nerve function or distribution, such as nocturnal enuresis, pedal atrophy, and talipes. It is well to be reminded of the association; there are occasions when it is overlooked, and the omission is regrettable, because correction of the initial error may result in a dramatic improvement in the peripheral lesion.

In describing the operative technique the authors refer to one interesting point. One of the risks attendant on spina bifida operations is the tendency to leakage of cerebrospinal fluid through the dural suture line. When such occurs the fistula is likely to persist, sooner or later infection develops, and meningitis

results. Accurate apposition and suture of the meninges minimize the risk, but a factor which may precipitate the error is a rising cerebrospinal fluid pressure, a development which often is consequent upon the operation. To counteract this tendency the authors practise a form of spinal fluid drainage; a small-gauge needle (No. 20) is thrust through a sterile cork (3 × 4 cm.) and inserted into the caudal sac at a point proximal to the operation site; when a free flow of fluid is obtained a needle is connected by an adaptor to an autoclaved

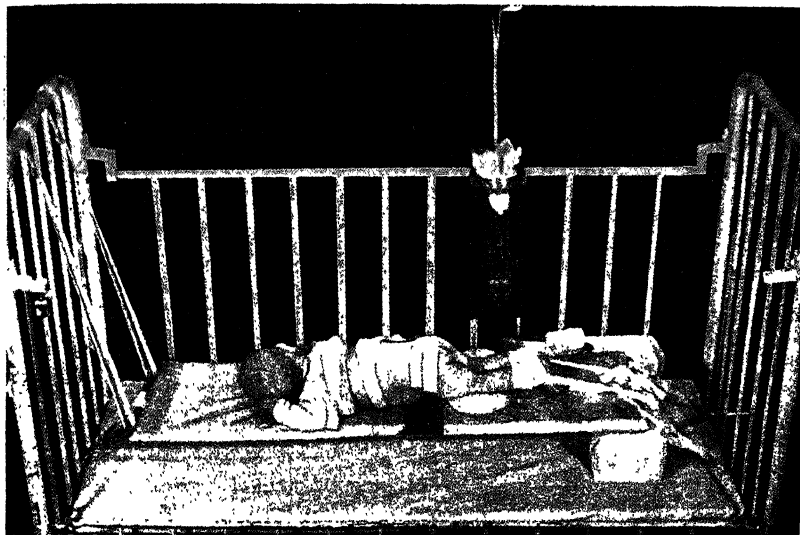


Fig. 28.—Spina bifida. Method of control of cerebrospinal fluid pressure by continuous spinal drainage. (Reproduced from the 'New England Journal of Medicine'.)

gravity apparatus consisting of narrow rubber tubing broken at one point by a medicine dropper for inspection of patency, and connected with a 25-c.c. burette (*Fig. 28*). The needle is held in a perpendicular position by taping the cork to the skin while the burette is suspended on the crib side, the position being raised or lowered so as to control the rate of fluid flow. This arrangement is continued until the cerebrospinal fluid pressure has become stabilized at a physiological level and the wound is healed; in an average case 200 to 300 c.c. of fluid are drained in twenty-four hours.

In speaking of the prognosis the authors deprecate undue pessimism; in their opinion 30 per cent of patients affected by spina bifida may expect to lead a relatively normal life assuming that operation has been carried out.

REFERENCE.—¹*New Engl. J. Med.* 1943, **228**, 559.

SPLEEN, SURGICAL DISEASES OF. *A. Rendle Short, M.D., F.R.C.S.*

Cysts of the Spleen.—These have been the subject of a number of publications. Although the disease is rare, a tentative diagnosis is quite possible, and was made recently in a case under the care of the surgical editor of the *MEDICAL ANNUAL*. The large protuberance in the left hypochondrium, with little or no pain, can scarcely be due to anything else. R. H. Sweet,¹ of Boston, reports 3 cases. In two of these a definite fluid wave could be detected on palpation. The X-ray examination was conclusive. A plain radiograph shows an opaque

mass in the upper left abdomen, pointed below, and pushing up the diaphragm. A barium enema shows displacement of the splenic flexure of the colon. Children and young adults are usually the sufferers. Splenectomy is neither difficult nor dangerous.

REFERENCE.—¹*New Engl. J. Med.* 1943, 228, 705.

STAPHYLOCOCCAL BACTERIÆMIA.

A. E. Barnes, M.B., F.R.C.P.

The treatment of staphylococcal infections is still unsatisfactory. Some hard facts are given by E. C. B. Butler and F. C. O. Valentine,¹ in a study of 32 cases treated in four years. They point out that the prognosis depends on the intensity of the infection, which can be estimated by the quantitative blood culture.

They classify their cases as follows: Group 1 (9 cases) with high figures, 500–1000 c.c. or with a rapidly rising count; all these cases die in a few days however treated. Group 2 (8 cases) over 30 per c.c., most of whom die, 5 out of 8; in these cases treatment may be the marginal factor. The authors lay great stress on treatment or excision of the primary focus; pulmonary metastasis is common and dangerous (abscess and pneumothorax). Group 3 (12 cases) with count under 20, most of whom recover (9 out of 12); this is the osteomyelitis group. Group 4, pyæmic abscesses with negative blood-cultures. They show a mortality of about 44 per cent for all bacteriæmic cases, which compares with a mortality of 81 per cent reported by Skinner and C. S. Keefer² in a series of 122 cases.

The difference in mortality in these four groups indicates that the publication of one or two successful cases of a treatment is useless unless the cultures showed a high-grade bacteriæmia. The English authors attach importance to serum treatment, 25 c.c. being given intramuscularly for three consecutive days, of a serum with a titre of about 10K, but they admit they have no proof of its value. They recommend that the primary lesion be excised or drained regardless of its apparent significance. They do this regardless of secondary lesions.

Chemotherapy has but a slight effect on the bacteriæmia in their experience. They recommend, however, sulphathiazole, 3–4 g. four-hourly, for three days, followed by 2 g. four-hourly for a further four days. In the reporting of results they stress the importance of repeated quantitative blood-cultures; presumed primary focus and its history; estimation of specific immunity of patient, derived from the previous history, or of the antileucocidin titre. The dosage recommended in the Medical Research Council's brochure³ is "maximal and prolonged doses (2–4 g. intravenously and 1.5 g. by mouth, followed by 1.5 g. four-hourly for 2 or 3 days, then two-thirds the dose for two days and one-third for two more days)". Even higher doses may be given controlling the treatment with frequent leucocyte counts, estimation of blood concentration of the drug, a test for the sensitivity of the organism, and repeated quantitative blood-cultures. Sulphadiazine and sulphathiazole are to be preferred. Treat local supuration by immobilization and incision if necessary.

REFERENCES.—¹*Lancet*, 1943, 1, 194; ²*Arch. intern. Med.* 1941, 68, 851; ³*Medical Use of Sulphonamides*, Rep. Med. Res. Coun. Lond. 1943, H.M. Stationery Office.

STENOSING TENOVAGINITIS AT THE RADIAL STYLOID (De Quervain's Disease).

T. P. McMurray, F.R.C.S.

Thickening, accompanied by narrowing of the lumen, of the sheath enclosing the tendons of the extensor brevis pollicis and abductor longus muscles on the outer aspect of the radial styloid, was described as a clinical entity by de Quervain in 1895. Attention has again been drawn to this extremely painful and disabling condition by Philip C. Potter,¹ who quotes very extensively from the

PLATE XXXVI

DE QUERVAIN'S DISEASE

(P. C. POTTER.)

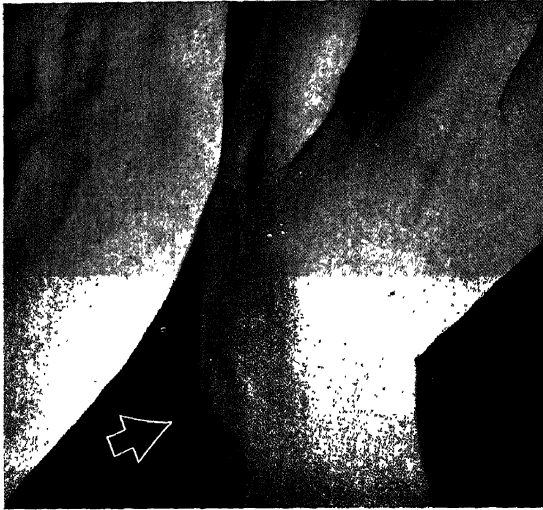


Fig. A.—Shows deformity of right wrist caused by thickening of the dorsal carpal ligament. This is not a constant finding.



Fig. B.—In stenosing vaginitis even slight forced ulnar deviation with the hand in this position causes extreme pain.

Reproduced from the 'Annals of Surgery'

original article. "Although chronic disease of the tendon-sheath is most frequently construed as tuberculosis, there are types which neither from the clinical picture nor from the anatomic findings should be placed in this category. This type of chronic non-tuberculous tendovaginitis has seldom called for surgical intervention, and is mentioned in most textbooks briefly, if at all. It therefore seems proper to discuss a condition which deviates in some respects from the typical clinical picture, and in which surgical treatment has proved beneficial."

The first patient treated by de Quervain for this disability was a housewife who noticed that the moving of her right thumb had gradually become painful. The pain was sometimes so severe that she was unable to make grasping movements, although there was no obvious swelling or signs of inflammation. On palpation a slight swelling could be detected over the tendon-sheath on the outer side of the radial styloid, and although movements of these tendons passing through this sheath were not accompanied by crepitus, the thickened sheath was extremely tender on pressure. Treatment had previously been attempted without any beneficial result. In this effort various forms of counter-irritant had been used, but the tenderness and the pain remained unrelieved. Assuming a stenosis of the sheath, de Quervain operated on the patient under local anæsthesia, and removed the sheath of the extensor brevis pollicis and abductor longus tendons. The sheath was found to be thickened but otherwise of normal structure, while the underlying bone was unaffected. Following the operation the pain disappeared and all the movements of the thumb could be completed easily and to their full extent.

Since the publication of de Quervain's paper many further observations bearing on this condition have appeared in surgical literature, but nothing has been added to the original description, and there is general agreement as to the necessity for surgical treatment. The exciting cause of the condition may be acute trauma, but more probably the thickening is caused by long-continued over-action of the abductor muscles of the thumb, the sheath being pressed constantly between the tensed tendons and the strong fibrotic dorsal carpal ligament. The suggestion that long-continued use is the most probable cause of the thickening is supported by the fact that the disability has become much more common, especially among war workers, and among women who have taken on unaccustomed heavy manual labour. As a rule, the patient cannot recall any severe injury to the wrist, and states that over a period of months the pain and disability have steadily increased, while even the pressure of a glove or the sleeve of a coat causes considerable discomfort.

The diagnosis of the condition is not difficult. The patient complains of pain over the outer aspect of the lower end of the radius; this pain is increased on any movement of the thumb. There is, as a rule, also an obvious thickening and swelling in the region of the radial styloid (*Plate XXXVI, Fig. A*), although pain on movement may be present before any swelling can be appreciated. Tenderness on pressure over the swelling, or over the radial styloid, even if swelling has not yet occurred, is a characteristic feature, while forced ulnar deviation of the hand with the thumb flexed in the palm will produce excruciating pain (*Plate XXXVI, Fig. B*). Radiographic examination of the wrist is always negative, although by its help other possible causes of pain in this region, such as an old fracture of the scaphoid, can be eliminated.

TREATMENT.—Treatment of the condition should always be operative. In a few instances relief and occasional cure have been reported following fixation of the hand and thumb in a plaster case for periods varying from 6 to 18 weeks, but in the majority of cases even more prolonged immobilization has produced no alleviation. Surgical treatment can be completed under local anæsthesia. That portion of the dorsal carpal ligament which overlies the thickened sheath

should be split ; as a rule this is sufficient, but a more certain result can be ensured by removing a portion of the ligament and the underlying sheath. In the operation wound a small branch of the radial nerve is found to lie almost directly under the line of the incision, and post-operative tenderness can be avoided by pulling the nerve backwards, while the ligament and sheath are being divided. Following the operation it is not necessary to employ rest, or even prolonged fixation of the hand or the thumb, freedom of movement being permitted from the time of the removal of the stitches.

On microscopic examination of the thickened sheath there is seen to be an accumulation of dense fibrous tissue with some round-celled infiltration. Occasionally a localized thickening of the ligament is present with a consequent hour-glass constriction of the tendons.

REFERENCE.—¹*Ann. Surg.* 1943, 117, 290.

STOMACH. (*See also* DYSPEPSIA IN THE SERVICES ; GASTRITIS ; GASTRIC AND DUODENAL ULCER ; ESOPHAGUS, LOWER, AND CARDIAC END OF STOMACH, CARCINOMA OF.)

STOMACH, POLYPOSIS OF.

Sir Henry Tidy, M.D., F.R.C.P.

E. I. Spriggs and O. A. Marxer¹ (Ruthin) have made a comprehensive study of polyps of the stomach and polypoid gastritis. The article is mainly based on 30 cases observed during 18 years in the course of the alimentary X-ray examination of 4424 persons, and is beautifully illustrated with reproductions of radiographs and pathological material. They also review a large number of cases recorded in the literature. They divide the lesions into two main groups, firstly papilloma or adenoma and leiomyoma, and secondly polypoid hyperplasia. In the first group they observed 10 cases diagnosed radiologically and one revealed at operation. With regard to clinical manifestations, small tumours away from the pylorus may cause no symptoms. If the tumours are multiple the condition may be symptomless, but usually is not. The symptoms are of dyspepsia, especially if there is prolapse into the pylorus, or gross hæmorrhage or silent bleeding with anæmia if the tumour becomes ulcerated. These polyps are prone to malignancy. Such a change was reported in between one in five and one in six of the series. The diagnosis is made by radiology and in suitable cases by the gastroscop. Six cases of polyps have been under observation for years without operation and without mishap. In the second group polypoid hyperplastic swellings of the gastric mucous membrane were observed in 19 cases, in 7 of which there was gastro-enterostomy or past or present peptic ulceration. In 3 of the remaining 12 cases there was evidence of excess of alcohol. All the 19 patients complained of dyspepsia with an inconstant food relation. In those with peptic ulceration free hydrochloric acid was usually present in the gastric juice. In nearly all cases without ulceration free hydrochloric acid was absent or low. In 3 cases patients' progress towards achlorhydria was noted over two to five years and was compatible with clinical improvement. With treatment the swellings and the symptoms subsided in most cases. The patients were all observed or reported upon at intervals for several years. The authors discuss the evidence in favour of the alternative views that the condition is of congenital origin or due to chronic inflammation.

F. L. Pearl and A. Brunn² (San Francisco) have also reviewed the subject under the title of "multiple gastric polyposis". In 1926 they collected 84 cases, and have now collected a further 41 cases from the literature and added 3 cases of their own. The study is independent of the previous article, but their conclusions are closely similar.

REFERENCES.—¹*Quart. J. Med.* 1943, 12, 1 ; ²*Surg. Gynec. Obstet.* 1943, 76, 257.

STOMACH, SURGICAL DISEASES OF. (See also GASTRIC AND DUODENAL ULCER.)

A. Rendle Short, M.D., F.R.C.S.

Origin of Carcinoma of the Stomach.—Histological studies by E. S. Judd,¹ of the Mayo Clinic, show that there are considerable changes, of very long standing, in the mucosa of a stomach which has become the seat of a carcinoma. The chief change is a hyperplasia of the mucous cells, which is not seen in the non-carcinomatous stomach. These changes are described as "residual lesions of ulcerative gastritis."

Gastroscopy.—Two papers may be noticed, by R. Schindler and P. Letendre,² of Chicago, and by E. B. Benedict and T. B. Mallory,³ of Boston. The Chicago writers report 3 cases of cancer seen with the gastroscope that were at first missed by the surgeon on palpation, and also at an exploratory laparotomy. In 10 out of 95 cases a gastric carcinoma was either missed or misinterpreted; these 10 failures are contrasted with 15 per cent of mistakes made in the radiological diagnosis of cancer. The Boston observers were more concerned with the gastroscopic diagnosis of various forms of gastritis, which they found accorded well with the histological findings.

Linitis Plastica.—O. Saphir and M. L. Parker,⁴ of Chicago, describe 26 cases, all cancerous; they doubt if a purely fibrous type of the disease exists, though a syphilitic stomach may resemble it closely. Although metastases are not usually found, the disease runs a much quicker course than the average in carcinoma of the stomach, and the period of survival after operation was only eleven days, or less.

Gastrectomy.—J. L. de Courcy,⁵ of Cincinnati, says that the mortality is still much too high, now that this operation is being more and more widely employed. According to Abell, from 8 to 10 per cent die. Proper preparation, including the administration of vitamins B, C, and K, is important. The stomach should be empty and clean before operation. The points in technique he stresses are: preservation of the middle colic artery, which must be carefully looked for; aspiration of the stomach contents; division of the stomach before division of the duodenum; careful stripping of duodenum from pancreas to facilitate closure; anastomosis of stomach to jejunum in front of the colon. If a dilatation of the stomach occurs during the days following, it must be kept empty by the Wangenstein tube.

C. B. Morton,⁶ of Virginia, and F. de Amesti,⁷ of Santiago, Chile, discuss the technique of total gastrectomy. Of the Chile surgeon's 9 patients, 5 survived the operation; the longest length of life afterwards was 18 months. In Morton's article, good illustrations are given of the method he uses.

C. A. Joll and D. I. Adler⁸ record a case of total gastrectomy surviving three years and two months, and another living three years and six months. The longest survivals recorded seem to be Zikoff's case, four years eight months, and Allen's, alive and well four years and six months.

REFERENCES.—¹*Surg. Gynec. Obstet.* 1942, 75, 424; ²*Ibid.* 547; ³*Ibid.* 1943, 76, 129; ⁴*Ibid.* 206; ⁵*Ibid.* 1942, 75, 785; ⁶*Ibid.* 369; ⁷*Ann. Surg.* 1943, 117, 183; ⁸*Brit. med. J.* 1942, 2, 682.

SUBPHRENIC ABSCESS.

A. Rendle Short, M.D., F.R.C.S.

Right-sided subphrenic abscess is a well-recognized condition, with an extensive literature; a left-sided abscess is uncommon, and not much has been written about it. H. Neuhof and N. C. Schlossmann,¹ of New York, present a study of 33 cases at Mount Sinai Hospital, over fifteen years. They all followed some intra-abdominal infection, usually a leaking gastric or duodenal ulcer. Others resulted from a splenectomy or biliary suppuration. There was in nearly all cases a stormy onset, when the abdominal infection arose, followed by a long relatively quiet period of weeks or months, during which the abscess slowly

developed. During this period the patient was vaguely ill, but there was nothing distinctive. Then the active phase supervened, with high fever, left thoracic pain, cough, painful breathing, and in some cases abdominal tenderness and distension. In only 7 patients were tumefactions to be felt or seen. Pain in the left shoulder was exceptional. Strange to say, only in 18 of 30 cases was the diaphragm domed up and immobile. Diagnosis was therefore often in doubt, and was not as a rule settled until pus was found by aspirating. It is important that operation should follow at once after aspiration of pus. Two methods of approach are recommended. One is subpleural at the level of the twelfth rib. If this is too low, a one-stage transpleural transdiaphragmatic method of approach and drainage is advised. A length of the seventh or eighth rib is excised in the anterior or mid-axillary line; the diaphragm is drawn up and sutured to the chest wall by a row of catgut sutures, to shut off the pleural cavity. The diaphragm is then incised and a second row of stitches unites its cut edges to the chest wall, covering the first row completely. The edges are protected with iodoform gauze, as the abscess is sought for and drained. The actual mortality of left subphrenic abscess has been 75 per cent, but it is hoped that this method of operating, together with earlier diagnosis, will improve the prospects.

REFERENCE.—*L.Surg. Gynec. Obstet.* 1942, 75, 751.

SUNSTROKE AND HEAT EXHAUSTION IN THE TROPICS.

Sir Philip Manson-Bahr, C.M.G., D.S.O., M.D., F.R.C.P.

In a paper on this subject K. S. MacLean¹ says that in a cruiser's crew of 21 patients suffering from conditions directly attributable to heat only one displayed hyperpyrexia. The symptoms of heat cramp are: muscular pains, headache, vomiting, dizziness, and panting respiration (sometimes). Collapse and death may occur unless treatment is promptly given. In some cases the patient may complain of headache, nausea, and dizziness alone. Cases in which cramps occur should always be regarded seriously. It is known that cramps are due to excessive chloride loss during profuse sweating, so that firemen have long realized that cure lies in drinking water and salt. Therefore this formed the basis of treatment. Two pints of water containing 2 drachms of salt were taken in sips during each 24 hours. In addition 8 pints of sweetened fluid to which 1 drachm of sodii bicarb. was added were taken each day. In severe cases with vomiting, rectal or intravenous salines were given.

Methods of prevention were:—

1. One lb. of salt per diem was added to distilled water for every 350 men carried. Assuming that 10 per cent of this is drunk, this ensures that on the average each man gets 20 gr. of salt per day as a basic ration. In addition men were instructed to add at least half a teaspoonful of salt to their drinking water each day (additional 30 gr.).
2. All ratings keeping watches below should take half a teaspoonful of salt in a pint of water every time they are on watch.
3. Everybody was instructed to take a teaspoonful of salt in a pint of water immediately they felt nausea, headache, or dizziness after being below or in the sun. If the water is ice-cold this is not unpalatable.

Hyperventilation tetany was seen in one man who showed signs of heat exhaustion.

REFERENCE.—*J. R. nav. med. Serv.* 1943, 29, 31.

SYPHILIS.

T. Anwyll-Davies, M.D., F.R.C.P.

Pathology: Morphology of *T. pallidum*.—A description of *T. pallidum* under the electron microscope has been given by U. J. Wile and E. B. Kearney¹ (Ann

Arbor). They were unable to determine flagella in the electron microscope, but flagella-like processes were demonstrable by inspection of the photographic plate. The photographic reproductions were enlarged to ten times the original, reaching a magnification of 80,000–90,000 diameters. The processes resemble in all respects flagella which have been demonstrated in other bacterial forms, occurring at different levels of the organism, but not demonstrable at the end. There is, however, every reason to believe that they occur here as well as elsewhere.

Dark-field Diagnosis.—Sometimes a positive dark-field examination of serum from an ulcer of the cervix is the only evidence of early infectious syphilis in the female. This is particularly true in sero-negative primary syphilis and is often valuable in beginning treatment immediately. J. W. Sharp, L. J. Alexander, and A. G. Schoch² cite 5 cases in which dark-field examinations established the diagnosis. One patient, a contact, showed only a small benign-looking ulcer on the cervix, but dark-field examination was positive and a diagnosis of sero-negative primary syphilis established. In 2 other cases, which apparently had no positive physical findings although blood-tests were positive, sero-positive primary syphilis was confirmed after examination of the serum from cervical ulcers.

Sero-diagnosis.—J. A. Kolmer,³ reviewing the study of spirochætal antigens in the serum diagnosis of syphilis, states that the complement fixation in syphilis is a *group reaction*, as positive reactions occur with antigens prepared not only of cultures of Reiter and other strains of *T. pallidum* but of *T. microdentium* and *T. macrodentium* as well. Antigens prepared from cultures of these spirochætes give a small varying percentage of non-specific or falsely positive complement fixation reactions with the sera of normal individuals and those with tuberculosis, malignant disease, and febrile intercurrent illness as ascribed to the presence of natural spirochætal antibody. The spinal fluids of non-syphilitics, however, do not give non-specific or falsely positive complement fixation reactions with spirochætal antigens.

Treatment: Massive Arsenotherapy.—The 5-day massive dosage for early syphilis has aroused great interest. If primary and secondary syphilis can be cured in this period, the control of syphilis will be revolutionized, and if further observation proves it to be safe and effective, this treatment offers the greatest advance in the therapy of syphilis since the introduction of salvarsan. L. W. Shaffer⁴ (Detroit) has reported on the present status of intensive arsenotherapy. This is being used in several different forms: the slow, continuous drip, the rapid drip, multiple injection, fever therapy plus multiple injection, and the one-day fever arsenic-bismuth method. Experience of these methods suggests that treatment should aim at the administration of 1200 mg. mapharside in a 5- to 12-day period. The addition of bismuth is a recent development, by which it is hoped further to increase the effectiveness of the method without accentuating toxic effects. Since July, 1941, the writer has given cases receiving intensive therapy 3 injections of lipobismol, 1 c.c. each (100 mg. metallic bismuth) on the first, third, and fifth day of the intensive treatment, and continuing with one injection at weekly intervals for 4 weeks following completion of the arsenic therapy. The period of observation is too short to reach definite conclusions, but Shaffer has practically no failures. No toxic encephalitis appeared in the 200 patients treated, suggesting that the addition of bismuth will not increase toxic reactions. An ambulant intensive method given to patients not receiving the 5-day intensive treatment consisted of 3 injections per week of mapharside, 0.04 to 0.06 g., depending on the body-weight, for a total of 20 injections. A course of 8 injections of bismuth was given: the first 2 injections being given during the last 2 weeks of the first course of mapharside; two weekly injections

for 2 weeks between the mapharside courses, and two overlapping injections of bismuth during the first two weeks of the second arsenical course, which consists of 10 injections of mapharside at the same dosage twice weekly, i.e., 30 injections of mapharside and 8 injections of bismuth in 13½ weeks. Treatment appears to be tolerated satisfactorily. The writer believes that two methods of intensive treatment will eventually develop—the 5-day or even 1-day hospitalization with special supervision, and an ambulant method giving 3 injections of mapharside weekly for a total of at least 1200 mg., probably combined with bismuth. Strongly positive primary and secondary syphilitics require 3–6 or more months for serological reversal, while less positive cases of early primary syphilis show serological reversal in 1–3 months. Therefore, a positive serological reaction on a recently treated case does not indicate failure or necessitate further treatment on this basis alone.

Lloyd Jones and Gordon Maitland⁵ have presented a modified form of intensive arsenotherapy based on the results of the quantitative Kolmer-Wassermann tests performed daily on a series of 100 patients. With this index of the intensity of the individual patient's infection, these early syphilitic cases could be readily classified into three groups—"early", "middle", and "late" primary syphilis, according to the type of graph representing the daily level of syphilitic reagin in the blood; the dosage of arsenoxide was regulated accordingly. The duration of injections once daily was 15, 20, or 30 days respectively, with total dosages of 600 to 900 mg., 900 to 1200 mg., and 1200 to 1800 mg., depending on body-weight. On account of the increased toxicity of neoarsphenamine compared with arsenoxide and because it is the routine drug in the Royal Navy, mapharside was used. The authors found that "with 0.04, 0.05, or 0.06 g. of mapharside *Sp. pallida* disappeared from the surface lesions in an average of less than 24 hours, thus proving that mapharside removes that organism from surface lesions in a time comparable with 0.45 to 0.6 g. of neoarsphenamine". The average time in the three categories for the chancre to heal was 7.7, 7.7, and 12.2 days. The only serious reaction was one case of agranulocytosis after a dosage of 1.130 g. Three days' treatment with pentnucleotide improved the blood-picture and recovery was complete after 110 c.c. of pentnucleotide. The jaundice figures (11) were "low compared with the high percentage of cases occurring with the routine neoarsphenamine schedules; only 4 were admitted to hospital". Other toxic manifestations, such as arsenical dermatitis, peripheral neuritis, and toxic encephalopathy, did not occur. Three cases relapsed clinically and serologically. Three other cases were re-infected.

Arseno-bismuth Therapy.—D. Kahn and S. W. Becker⁶ (Chicago University) report on the treatment of latent syphilis with bismuth compounds combined with moderate amounts of arsenicals, and they compare their results with those obtained by the Co-operative Clinical Group. Nearly all their 200 patients had been infected for four or more years. Treatment consisted of a minimum of 6 courses of bismuth subsalicylate in oil (8–10 weekly intragluteal injections) with rest periods of 1 month, while an arsenical course (6–8 intravenous injections at weekly intervals) was given simultaneously with the second, fourth, and sixth bismuth courses. Treatment was then continued with courses of bismuth at progressively longer intervals (3, 6, and 12 months), followed by a yearly course of bismuth as long as the serological test was positive. The authors tabulate their dosage and results, together with those of the Co-operative Clinical Group, and conclude that combined bismuth and arsenical therapy is superior to the same drugs used in alternating courses, supporting the fact, shown experimentally by N. M. Clausen, B. J. Langley, and A. L. Tatum,⁷ that *the therapeutic effects of fractional doses of arsenicals and bismuth given together are mathematically additive, while the toxic effects are considerably less than additive.*

A. O. F. Ross⁸ substituted mapharside in the Liverpool Clinics, where neoarsphenamine had previously been used twice weekly for the past eighteen years. He has reported on 150 cases of early syphilis, employing a standard course of twice-weekly injections, 0.04 and 0.06 g. per week for six weeks, a total of 0.6 g. mapharside and 1.2 g. of bismuth. This scheme resulted in serological reversal in 100 per cent of primary and secondary cases three months after one course of treatment. The toxic reactions among 1200 cases treated in this way "have been minimal". One death from encephalitis occurred in a Hindu seaman who also had lymphopathia venerea. Ross's comparative figures show that "weight for weight, mapharside is seven-and-a-half times as potent as neoarsphenamine and considerably less toxic."

Syphilis Complicated by Pregnancy.—Mapharside and lipobismol were used by S. D. Soule and A. R. Bortnick⁹ (Washington) in the treatment of latent syphilis among pregnant women. The treatment depended on the number of weeks of gestation remaining after the patient presented herself for treatment, but a minimum of 20 weeks of arsenic-bismuth therapy was considered adequate. A characteristic course of treatment was (1) mapharside, 10 injections (from 0.03 g. to 0.06 g. each); (2) bismuth (lipobismol), 10 injections (1.0 c.c. each); (3) mapharside, 10 injections. The last three mapharside injections of the first series were overlapped with intramuscular injections of bismuth. If the patient was late in pregnancy, mapharside alone was given at weekly intervals until delivery. The authors discuss 100 patients whose children were available for examination at 3 months of age; 79 of the babies were normal. (A normal child was considered to be one who at 3 months of age had no physical or serological evidence of the disease.) The average total dosage of mapharside given to the 79 women who delivered normal babies was 384 mg., the average number of injections 11.5, and the average dose of mapharside 0.034 g. All patients tolerated the drug well, the most severe reactions being two instances of transient pruritus. The necessity of adequate dosage, the early institution of treatment (preferably before the middle of pregnancy), and the importance of arsenic at the beginning and end of treatment, is stressed. The writers have increased the dosage to 0.06 g. per injection, giving an average total dosage of 500–700 mg., and they hope, by starting treatment early, to eliminate all seropositive infants.

Congenital Syphilis.—Further investigation by G. D. Astrachan and V. A. Cornell¹⁰ (New York) has confirmed their opinion¹¹ that mapharside is useful in both early and late congenital syphilis. They treated 87 patients (57 late congenital syphilitics, 11 early congenital syphilitics, and 19 latent congenital syphilitics). Bismuth injections were given alternately or concurrently with the arsenoxide. The late congenital syphilitics received an average of 21 injections of mapharside (doses ranging from 2 to 40 mg.); 55 per cent of the patients showed serological improvement. Among early congenital syphilitics receiving an average dosage of 17.3 mg. mapharside, serological reversal was obtained in 70 per cent. The authors believe that 0.75 mg. per kilo body-weight should be the maximum dosage. It is less toxic to children than to adults; it can be given intramuscularly in cases in which attempts at intravenous therapy have failed. The early congenital syphilitics who received intramuscular injections did not show signs of discomfort, but slight to moderate pain lasting from 1 to 6 hours was recorded in 17 adult patients.

Phenarsine Hydrochloride Treatment.—W. E. Long¹² (Boston) gave 2038 injections of phenarsine hydrochloride (3-amino-4 hydroxyphenyldichloroarsine hydrochloride) to 96 syphilitic patients. This preparation, a new trivalent arsenical, caused rapid disappearance of *Sp. pallida*; lesions healed rapidly, clinical or infectious relapse did not occur, the serological reversal was satisfactory,

and the incidence of abnormal spinal fluids among early syphilitics was low. Patients with late syphilis tolerated the drug, their symptomatic improvement was good, and the results were satisfactory. Its toxicity does not differ materially from that of mapharside: reactions were few and chiefly confined to mild gastro-intestinal disturbances. From a preliminary study, W. H. Guy, B. A. Goldmann, and G. P. Gannon¹³ (Pittsburgh) consider that phenarsine hydrochloride compares favourably with, and will prove more stable than, other drugs now available.

Intolerance.—H. M. Robinson¹⁴ believes that the role post-arsphenamine reactions play is negligible in the cure of symptoms or in reversing a positive serological test to negative. To prevent reactions he advises: avoid rush, confusion, and fright; relieve constipation; avoid heavy undigestible diet; have patient drink distilled sterile water; have tubing soaked in NaOH 4/10 normal; avoid speed, even with mapharside; take care of foci of infection. When a nitritoid crisis has occurred, continuation of treatment should consist of intramuscular injections of a bismuth compound, followed preferably by arsenoxide if further treatment is considered necessary. Resumption of treatment after recovery from jaundice is usually permissible, but must be begun with one-tenth the usual dosage.

Jaundice and Dermatitis.—S. F. Dudley¹⁵ has introduced mapharside as the routine arsenical drug for the treatment of syphilis in the Royal Navy on account of the high incidence of jaundice in recent years following the use of neoarsphenamine (N.A.B.). Arsenoxide has already been adopted for routine treatment of syphilis in the U.S. and Canadian Medical Services. In addition to a lower toxicity it has the advantage of being a stable chemical compound. In naval patients mapharside has been found to be less icterogenic than N.A.B., and the rapidity with which spirochaetes, early clinical lesions, and Wassermann-positive reactions disappear after treatment with this drug has been found to compare favourably with the results following neoarsphenamine. Dudley suggests that, if arsenoxide plus bismuth is as good or better than neoarsphenamine plus bismuth, a trial of mapharside plus bismuth is indicated. He considers that the work of Anwyl-Davies, giving as it does comparative figures and observations for neoarsphenamine and mapharside, justifies the decision to substitute mapharside for neoarsphenamine in the Navy and confirms the conclusions of the American venereologists.

Comparison of Arsenoxide (Mapharside) and Neoarsphenamine.—T. Anwyl-Davies¹⁶ (London) has published the first exhaustive analysis of the comparative effects of arsenoxide and neoarsphenamine in English practice. In a survey of the records from St. Thomas's Hospital, 1929–41, he has outlined the history of the arsenicals and of the toxic reactions following their use, culminating in the introduction in 1932 of arsenoxide by Tatum and Cooper and its debut into clinical medicine by Foerster and his colleagues in 1935. The therapeutic results with mapharside at St. Thomas's Hospital, where it has been in routine use since 1936, have been more than equal to those of neoarsphenamine. In the writer's experience, the therapeutic ratio of the two drugs is 1 : 7.5 or 1 : 8 (0.04 g. mapharside equals in potency 0.3 g. neoarsphenamine). The *spirochaetocidal* effects of the two drugs were compared, with the following results:

Drug and dosage	No of cases	Negative in 24 hours	Negative percentage
Neoarsphenamine,* 0.45 g ..	191	144	75.3
" 0.60 g. ..	18	15	83.3
Mapharside, 0.04 g. ..	10	8	80.0
" 0.06 g. ..	27	25	92.5

* Six brands, all on the Ministry of Health's List of Approved Arsenicals.

Wassermannotropic Effects.—The results in early syphilis of a continuous system of mapharside and bismuth on the Wassermann reaction are recorded in the following three tables:—

EFFECT OF MAPHARSIDE IN SERO-NEGATIVE PRIMARY SYPHILIS.

<i>W.R. at end of :—</i>	<i>No. of cases</i>	++	+	—	<i>Percentage of negative reactions</i>
1st course ..	121			121	100
2nd course ..	86			86	100
3rd course ..	66			66	100
4th course ..	40			40	100

EFFECT OF MAPHARSIDE IN SERO-POSITIVE PRIMARY SYPHILIS.

<i>W.R. at end of :—</i>	<i>No. of cases</i>	++	+	—	<i>Percentage of negative reactions</i>
1st course ..	245		3	236	96.3
2nd course ..	106		1	104	98.1
3rd course ..	73			73	100
4th course ..	54			54	100

EFFECT OF MAPHARSIDE IN SECONDARY SYPHILIS.

<i>W.R. at end of :—</i>	<i>No. of cases</i>	++	+	—	<i>Percentage of negative reactions</i>
1st course ..	135	12	7	98	72.5
2nd course ..	104	1	3	97	93.2
3rd course ..	81		1	78	96.2
4th course ..	62			60	96.7

The first course aimed at a dosage of 0.66 g. mapharside with 4.8 g. bismuth in 14 weeks (with twice-weekly injections of 0.06 g. mapharside during the first 3 weeks) and a second course of 0.60 g. mapharside with 3.2 g. bismuth in 18 weeks. The serological and clinical results of 501 cases, after completion of at least one course of mapharside and a subsequent blood test, were analysed. Most defaulted before or as soon as the fourth course was completed, but 141 were examined periodically, generally every 3 months *after the cessation of treatment*. Some were observed for 3–5 years. No seropositive primary case relapsed, either serologically or clinically; 3 secondary cases relapsed; 3422 patients had 950 (27.58 per cent) attacks of post-arsenical jaundice or dermatitis during the period 1929–41; of these, 776 (22.53 per cent) had jaundice and 174 (5.05 per cent) had dermatitis. Of 1946 patients treated with neoarsphenamine, 574 (28.90 per cent) developed jaundice and 134 (6.75 per cent) dermatitis (a total of 35.65 per cent). Of 1147 patients treated with mapharside, 146 (12.73 per cent) developed jaundice and 14 (1.22 per cent) dermatitis—total 13.95 per cent. Mapharside gave the lowest percentage of intolerance (13.95 per cent) and the shortest average illness of 18.7 days per attack of jaundice compared with the other arsenicals, and its substitution for the neoarsphenamines has considerably reduced the mortality-rate. During 1936–40 one death occurred per 20,467 injections of mapharside against one death per 5660 injections of neoarsphenamine during the previous 5-year period 1931–5. During the four years 1936–9, when mapharside was in routine use, a total of 13 cases of jaundice and dermatitis spent altogether 271 days in hospital, whereas in the previous four neoarsphenamine years, 1932–5, more than three times as many cases (42) required 892 days' hospitalization. Anwyl-Davies concludes that arsenoxide is a more efficient and a less toxic remedy than the neoarsphenamines and that this may be due to the difference in constitution and to the method of breakdown either before use or after injection in the body.

Encephalitis.—Anwyl-Davies¹⁷ (London) refutes the suggestion that arsenoxide (mapharside) is more prone to cause encephalitis than neoarsphenamine.

Post-arsenical encephalitis is fortunately rare, and at St. Thomas's Hospital no case has occurred in the Venereal Department since its establishment 25 years ago, either with the neoarsphenamines from 1917-36 or with mapharside, the routine drug from 1936 to the present time. Distinction should be made between the incidence of encephalitis with orthodox methods and that due to modern massive arsenotherapy, which has inevitably caused an increase in toxic accidents. U.S. naval statistics of reactions to neoarsphenamine compared with those due to mapharside^{18, 19} when given by orthodox methods, indicate that the latter is definitely the less toxic. A greater number of cases of encephalitis has been recorded after massive mapharside than with massive neoarsphenamine, because the percentage of reactions with the latter was so high that this drug had rapidly to be discarded for mapharside—so rapidly that few figures exist of the reactions due to massive neoarsphenamine therapy. W. Leifer, I. Chargin, and H. T. Hyman²⁰ give figures favouring mapharside rather than neoarsphenamine, while D. C. Elliott and his co-workers²¹ had 5 deaths from encephalitis in the first 1600 cases treated with massive mapharside therapy. With regard to the general question of the relative toxicity of neoarsphenamine and mapharside, Anwyl-Davies quotes the records of St. Thomas's Hospital, which show that, while from 1929-36 8 deaths from arsenical poisoning occurred in 70,102 injections of neoarsphenamine (1 in 8762), from 1936 to May 31, 1943, 1 death occurred in 45,781 injections of mapharside. E. A. Levin and F. Keddie²² state that "the death-rate is 1 to 67,332 injections of mapharside (in a series of 269,326 injections). This is less than one-half the death-rate from neoarsphenamine".

(See also CHEMOTHERAPY OF SYPHILIS.)

REFERENCES.—¹J. Amer. med. Ass. 1943, 122, 167; ²Urol. cutan. Rev. 1943, 47, 171; ³Amer. J. med. Technol. 1943, 9, 38; ⁴Ven. Dis. Inform. 1943, 24, 108; ⁵Brit. med. J. 1943, 2, 448; ⁶J. Amer. med. Ass. 1942, 120, 338; ⁷J. Pharmacol. 1942, 74, 324; ⁸Lancet, 1943, 1, 704; ⁹J. Missouri med. Ass. 1943, 40, 97; ¹⁰J. Amer. med. Ass. 1943, 121, 746; ¹¹Arch. Derm. Syph. 1938, 38, 943; ¹²Ibid. 1943, 47, 226; ¹³Ibid. 235; ¹⁴Pennsylvania med. J. 1943, 46, 667; ¹⁵J. R. nav. med. Serv. 1943, 29, 170; ¹⁶Ibid. 153; ¹⁷Brit. med. J. 1943, 2, 20; ¹⁸U.S. Nav. med. Bull. 1929, 27, 205; ¹⁹Ibid. 1940, 38, 587; ²⁰J. Amer. med. Ass. 1941, 117, 1154; ²¹Ibid. 1160; ²²Ibid. 1942, 118, 368.

TENDOVAGINITIS, STENOSING. (See STENOSING TENDOVAGINITIS.)

TESTICLES, SURGERY OF.

Hamilton Bailey, F.R.C.S.

Epididymo-orchitis.—C. Wesselhoeft and S. N. Vose¹ advise early operation in severe *epididymo-orchitis of mumps*; this relieves pain, reduces the fever, and avoids atrophy. The operation must be performed early, i.e., within 48 hours of the onset. The tunica vaginalis is exposed through a short scrotal incision, the tunica is opened, and the epididymis is decapsulated. If the body of the testis feels stony-hard and is covered with petechial hæmorrhages, a short incision is made through the tunica albuginea, and if this release of tension is considered to be insufficient, a further incision is made at right angles to the first. The scrotum is drained with corrugated rubber and a T-bandage applied over the dressing. [In 4 cases operated upon by the reviewer, the epididymis was mainly involved and was plum-covered. Symptomatic relief was immediate.—H. B.]

H. K. Vernon² finds that acute epididymo-orchitis is far more commonly due to *B. coli* infections than to gonorrhœa. Probably the chemotherapy treatment of gonorrhœa has reduced the incidence of acute epididymitis.

C. Morson³ describes a case of acute epididymo-orchitis due to *Pfeiffer's bacillus*. The lesion subsided in a month without suppuration. N. J. Heckel and F. W. Preston⁴ report a case caused by the *pneumococcus*.

Torsion of the Testis and the Appendix of the Testis.—J. E. Heslin and R. E. Allyn⁵ refer to the frequency with which torsion of an appendix is confused

with epididymo-orchitis. As most of the patients are between 11 and 14 years of age, in the absence of any sign of urethritis or a history of recent mumps, epididymo-orchitis is very unlikely.

M. Wolf⁶ stresses the necessity for immediate exploration in cases where the symptoms suggest torsion of the testicle. So often valuable time is wasted (a) by confusion of the diagnosis with that of epididymo-orchitis, or (b) if a correct diagnosis is made, attempting to remedy the condition by manipulation.

E. K. Morgan⁷ says that exquisite tenderness confined to the scrotum which defies satisfactory palpation because of extreme pain, together with a history of sudden onset, should immediately suggest acute torsion, not, as is so frequently the case, traumatic epididymitis, which is, in effect, a somewhat mythical entity.

Relation of Trauma to Testicular Disease.—A. E. W. McLachlan,⁸ from his wide experience in venereal clinics, agrees that traumatic orchitis is extremely rare, and that many patients attribute their swollen testicle, from any cause, to a strain. However, true cases of traumatic epididymo-orchitis undoubtedly occur, and he cites one case where, following a blow on the testicle, the patient developed a fungus testis which necessitated orchidectomy.

Trauma is alleged in 15 per cent of cases of malignant disease of the testicle. There is no evidence of any aetiological relationship between them. Litigation claims have been settled on the basis of sympathy, not science (J. B. Gilbert⁹).

Testicular Atrophy and Herniotomy.—J. W. Baker and M. M. Evoy¹⁰ have investigated the occurrence of atrophy of the testicle following operation for herniotomy. They find that the most frequent cause is constriction of the venous return of the cord, and the preventive treatment is the establishment of an adequate-sized aperture for the passage of the cord. If the testicle is painlessly enlarged to $1\frac{1}{2}$ times its size 24 hours after operation, they recommend incising the coverings of the tunica albuginea under local anaesthesia. Haemorrhage is partly controlled with hot packs and the scrotum is drained. In a case where there was a demonstrable swollen testicle and nothing was done, atrophy of the testicle occurred. In a similar case where decompression was performed, no atrophy occurred.

Maldescent.—J. H. Lapin et al.,¹¹ as a result of observing 200 boys with cryptorchidism at an endocrine clinic, have come to the following conclusions. The maximum dose of chorion gonadotropin should not exceed 6000 international units. Small frequent doses should be given over a period of six weeks without any period of rest. If the treatment is unsuccessful, operation should be advised. A further course can be given after operation if thought advisable. L. M. Ranker and S. A. Eger¹² believe that the best age for operation is about five years, because at that time the child is properly trained in toilet habits.

Hydrocele and Cysts of the Epididymis.—V. E. Hockett¹³ finds that 2.9 per 1000 of candidates for the U.S. Navy have a hydrocele, and he draws attention to the value of injection therapy for these cases. He recommends 3 or 4 c.c. of 5 per cent sodium morrhuate as an injection medium, and says there is sufficient post-injection pain, lasting three or four hours, to warrant giving 5 gr. of aspirin or $\frac{1}{4}$ gr. morphia, as necessary. He further says that quinine urethane solution causes considerable pain—presumably more than when using sodium morrhuate.

[I have used quinine urethane for five years. In my experience it is quite exceptional for the patient to complain of any pain at all, except for a 'sting' which goes off in five minutes. Eighty-three per cent of the cases have been cured by injection, and in 12 per cent operation was subsequently carried out. The remaining 5 per cent failed to report.—H. B.]

C. P. G. Wakeley¹⁴ says there is little doubt that the majority of cysts of the epididymis arise in that bridge of tissue between the testicle and epididymis,

namely, the vasa efferentia. He favours excision of the cyst, rather than injection therapy.

Neoplasm of the Testicle and Scrotum.—R. H. Willis and H. B. Ruddock¹⁵ find that teratomata of the testicle in young horses are more common in the fully descended organ. Formerly it was believed that the tumour occurred more frequently in cryptorchid animals. This was because the late Sir John Bland-Sutton obtained his data from Sir Frederick Hobday, who being a specialist veterinary surgeon, was called to perform the more difficult operation of castration in cryptorchid animals.

P. Rosenblat et al.¹⁶ found that in cases of testicular neoplasm the average time that the swelling had been present before the patient sought advice was over fifteen months. The greatest incidence of teratomata is between the ages of 20 and 30, while that of seminomata is between 30 and 40.

E. M. Brockbank¹⁷ emphasizes how necessary it is to remove at once local thickening of skin or a simple papilloma or wart of the scrotum in a mule-spinner, in order to prevent hopeless extension of the glands of the groin of a carcinoma. Mule-spinner's cancer is undoubtedly due to irritation of mineral oil, and a predisposing cause is an abnormally dry skin, especially in older men.

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THROAT INFECTIONS: POST-ANGINAL SEPSIS.

F. W. Watkyn-Thomas, F.R.C.S.

S. H. Boharas¹ describes and comments on 2 cases of septicaemia due to septic phlebitis of the internal jugular or of a branch following infection of the throat. In both cases the sore throat was 'mild' and the only localizing sign was tenderness at the angle of the jaw. In one case there was slight swelling, which quickly disappeared. In both there were rigors and septic metastases; neither was affected by massive doses of sulphonamides. In one case a retro-tonsillar abscess was found, with a perforation of the superior pharyngeal constrictor, a parapharyngeal abscess, and thrombosis of the jugular vein, which was tied and divided. In the second case there was an abscess in the tonsil substance, but no retro-tonsillar collection and no perforation of the superior constrictor. This patient recovered without any operation on the vein. [Strictly speaking, in this case septic phlebitis of the jugular or a branch is not proven, although such a condition may be fairly deduced from the clinical history.—F. W. W.-T.]

Boharas points out that there is no definite correlation between the severity of the primary attack and the severity of the symptoms, and that severe septicaemia may occur with slight phlebitis and with or without actual thrombosis. In an analysis of 105 reported cases the great majority followed an infection in or about the tonsils; in a small percentage, tonsillectomy, infections of the ear, adenoids, the floor of the mouth, jaw, cervical vertebra, parotid gland, nose, paranasal sinuses, or mastoid. [In the mastoid cases the possibility of a petrosal abscess bursting through the inferior surface of the petrous must be remembered.—F. W. W.-T.]

Symptoms.—*Local symptoms*—pain, trismus, torticollis, dysphagia, and hoarseness—may be transient or absent. The most constant sign—tenderness at the angle of the jaw—may quickly disappear. *Systemic symptoms* may not appear until sixty days after the throat lesion has healed; the average time from the first infection of the throat is fourteen days. The symptoms are those of septicaemia. There may be symptoms due to irritation of the hypoglossal,

spinal accessory, vagus, or glossopharyngeal by the spread of infection into the parapharyngeal space.

Complications.—Apart from septic metastases, these are numerous and grave—hæmorrhage from the carotids, mediastinitis with asphyxia, retrograde extension of the phlebitis to the jugular bulb and thence to the lateral sinus, the pterygoid plexus, ophthalmic vein, or cavernous sinus, with all that such extension implies. In unrecognized cases the mortality is nearly 100 per cent.

Diagnosis.—Boharas estimates that in only 20 per cent of the fatal cases was the condition recognized in life. "In the absence of any other demonstrable cause of sepsis a history of a recent inflammation of the throat, however slight, must always lead to a suspicion of phlebitis of the internal jugular or of one of its branches." To wait for marked œdema or tenderness may be fatal, and blood-cultures are often negative. He sums up thus: "The possibility must be considered in every case of septicæmia of unknown origin. The diagnosis is easy to make if the following sequence of events is considered: (1) An infection of the throat has occurred, according to the history or evidence from examination. (2) A definite state of septicæmia has developed. A latent period may or may not have elapsed between the infection and the time of onset of sepsis. A definite diagnosis may be made on finding tenderness, swelling, or induration of the neck in a patient presenting the characteristic clinical picture, provided all other causes for sepsis are first ruled out. Swelling of the lateral wall of the pharynx or displacement of the tonsil may be additional evidence of this disease, but the absence of these signs is of no diagnostic importance."

Treatment.—This is surgical; external drainage of the parapharyngeal space with ligation of the jugular. Some observers believe that the tonsil should be removed as well. Chemotherapy may be helpful as a supplement to surgery.

[The anatomy of the parapharyngeal space and the pathways of infection are described in the MEDICAL ANNUAL, 1941, p. 326.]

REFERENCE.—¹*Arch. intern. Med.* 1943, 71, 844.

THROMBOPHLEBITIS. (See BLOOD-VESSELS, SURGERY OF.)

THUMB SUCKING. (See FINGER SUCKING.)

THYMUS GLAND.

Sir Walter Langdon-Brown, M.D., D.Sc., F.R.C.P.
Samuel Leonard Simpson, M.A., M.D., F.R.C.P.

The Thymus in Relation to Myasthenia Gravis.—Since some 50 per cent of fatal cases of myasthenia gravis are associated with a tumour or gross hyperplasia of the thymus gland, the condition has been treated by thymectomy or deep radiation. D. McEachern¹ records that of 13 patients who had their thymus removed, and who survived, all appeared improved, and a few appeared to be cured. Roentgen therapy was less successful. G. L. Keynes² described the technique followed by him, and J. Carson, reporting on 12 cases operated on by Keynes, stated that 3 appeared quite well and were living an active life 9, 6, and 3 months respectively, 3 were improved, 3 died, and the remaining 3 were not improved perceptibly. A death-rate of 25 per cent appears high, but the gravity of the condition must be borne in mind. An extract from the removed thymus did not produce muscular weakness when injected into animals. Keynes³ has now performed the operation on 25 patients, and points out the great care necessary in the selection of cases for operation. In the discussion which followed these communications emphasis was laid on the frequent association of hyperthyroidism with myasthenia gravis.

REFERENCES.—¹*J. Amer. med. Ass.* 1943, 122, 340; ²*Proc. R. Soc. Med.* 1943, 37, 42; ³*Brit. med. J.* 1944, 1, 22.

THYROID GLAND.

Sir Walter Langdon-Brown, M.D., D.Sc., F.R.C.P.
Samuel Leonard Simpson, M.A., M.D., F.R.C.P.

HYPERTHYROIDISM

Signs and Symptoms.—

Eye Signs.—In 1941, N. M. Harry, of Melbourne, drew a distinction between upper lid retraction and exophthalmos, both occurring with thyrotoxicosis, the former, however, being more directly concerned with the thyrotoxicosis (MEDICAL ANNUAL, 1942, p. 311). K. C. Eden and W. R. Trotter¹ pursue this theme in an article on *lid-retraction in toxic diffuse goitre*, and produce clinical evidence to show that the lid-retraction is directly dependent upon the presence and degree of thyrotoxicosis, although an extra-thyroid factor may be present in a small proportion of cases. As regards its incidence, lid-retraction occurred in 72 of 134 cases of toxic diffuse goitre, whereas exophthalmos was present in only 36. Lid-retraction was seldom encountered in toxic nodular goitre or in patients treated with thyroid extract. It may occur in severe myopia, cerebral lesions, and congenitally. In 1936 Russell Brain described a condition of exophthalmic ophthalmoplegia which tends to occur in middle-aged people, and may be unilateral in an initial phase. It is not necessarily associated with thyrotoxicosis, and may be associated with myxoedema after thyroidectomy. A similar condition may be experimentally produced by injections of pituitary thyrotropic hormone in the absence of the thyroid gland. Eden and Trotter suggest, as others have done before them, that the exophthalmos associated with thyrotoxicosis may be due to such a thyrotropic hormone. Upper-lid retraction, due to spasm of the levator palpebræ superioris, is the basis of the classical Dalrymple (wide palpebral fissure) and von Graefe (lagging of upper eyelid on looking down) signs. Eden and Trotter point out that if the patient looks directly forward, retraction of the upper eyelid can be diagnosed if it reaches just to the upper limit of the iris or shows some white sclerotic between the lid and the iris. The presence of such white sclerotic between the lower limit of the iris and the lower eyelid denotes exophthalmos. The practical significance of all this is that lid-retraction associated with thyrotoxicosis will nearly always disappear after adequate thyroidectomy, whereas exophthalmos may or may not.

W. H. Soley,² dealing with *exophthalmos in patients with various types of goitre*, points out that exophthalmos (as distinct from lid-retraction) in man is not due to stimulation of the cervical sympathetic nerve and Müller's muscle, and contrary to Jonnesco's original claim, is not relieved by sympathectomy; nor does the latter procedure produce true enophthalmos in normal people. Round-cell infiltration, marked œdema, fibrosis, and swelling of ocular muscle, are present in exophthalmos. Using a Hertel exophthalmometer, Soley found that in only 10 per cent of patients suffering from primary thyrotoxicosis (diffuse toxic goitre) was exophthalmos measurably decreased, and in over 50 per cent exophthalmos was increased, after otherwise successful thyroidectomy. He records the observation of Grave and Weeks that there was no change in exophthalmos following subtotal thyroidectomy in 80 patients with toxic goitre. This is contrary to general clinical experience, which, according to Soley, fails to differentiate between true exophthalmos and apparent exophthalmos associated with lid-retraction. Soley confirms the clinical observation that in toxic nodular goitre exophthalmos is slight or absent.

Pre-tibial Myxoedema.—This was first described by Watson-Williams in 1895, but it has continued to remain somewhat obscure. W. R. Trotter and K. C. Eden³ describe 4 cases. Clinically, the lesions consist of irregular firm swellings, involving the skin, which may be pink, or brown, or hairy, and are usually distributed in the antero-lateral aspect of the lower half of the legs, rarely giving

rise to symptoms. They may be associated with thyrotoxicosis, or with myxœdema, or with a normal metabolic rate, whereas local myxœdematous patches occurring in other parts of the body are almost invariably associated with general myxœdema. When the tibial lesions are associated with thyrotoxicosis, they may disappear or be unaffected or be aggravated by successful thyroidectomy. Their incidence and response, or lack of response, to treatment, is difficult to explain, and they may disappear spontaneously after some years without obvious change in the patient's general condition. The authors postulate, with reticence, an aetiological pituitary thyrotropic factor, which may be common to thyrotoxicosis or myxœdema. Histologically the lesions show a splitting and separation of the connective-tissue fibres by a mucoid material taking the specific thioxin blue stain for mucin.

Complications.—F. A. Bothe, H. M. Simpson, and L. G. Rowntree⁴ describe a case of *rarefaction and spontaneous fracture of the dorsal spine* in a male age 40, after four years of thyrotoxicosis. They state that only 7 cases of spontaneous fracture have been similarly recorded, usually in long bones or spine, although demineralization of the skeleton in hyperthyroidism was first observed at post-mortem by von Recklinghausen in 1891. Roentgen examination has made its detection in life more easy, and Aub has found an increased excretion of calcium and phosphorus without, however, any abnormal blood-concentration of these elements. The serum phosphatase is usually raised. Clinically, apart from spontaneous fracture, pain is the outstanding symptom. The osteoporosis tends to disappear after adequate thyroidectomy, but the process of recalcification may be a slow one.

Diagnosis: Galactose Tolerance Tests in Thyrotoxicosis.—It is recognized that liver damage occurs in severe thyrotoxicosis, as is indicated by functional tests, such as the hippuric acid test, and by autopsy findings. It is also known that tolerance for galactose given by the mouth is apparently impaired also, which has been accepted as evidence of impaired liver function. C. J. Barnes and E. J. King,⁵ however, point out that experimentally thyroxine produces an accelerated absorption of galactose from the intestine, and their results show that the reduced tolerance curves when galactose is given orally are due to this accelerated absorption and not to impaired liver function, since the tolerance curves after intravenous galactose proved normal in the series of cases investigated by them. It is probable also that the tolerance for intravenous galactose is not a sensitive index of liver function. They calculated a galactose 'index' as a measure of apparent decreased tolerance to galactose given orally, and found that this index is a reliable measure of the degree of thyrotoxicosis judged clinically, although it does not necessarily correspond with the basal metabolic rate, and is not appreciably modified by iodine. In their experience a normal index after galactose given orally excludes moderate and severe degrees of thyrotoxicosis, but not necessarily mild degrees. For the oral test patients drank 40 g. of galactose in 400 c.c. of cold water, and for the intravenous test 50 c.c. of 50 per cent galactose solution were injected intravenously.

Treatment.—N. Garber⁶ has reviewed the *pre-operative and post-operative measures* in the treatment of thyrotoxicosis. The former are based largely on the necrosis and infiltration of the liver recorded at autopsy in thyrotoxic patients. The measures are: (1) High carbohydrate diet, with vitamin B complex to assist carbohydrate metabolism, and daily intravenous infusion of a litre of 10 per cent glucose saline; (2) 5 units of insulin before meals; (3) Bile-salts and liver concentrates by mouth; (4) Glycine, 6 g. daily, to prevent breakdown of body protein.

The author confirms the conventional view in the use of iodine for ten to fourteen days before operation. Auricular fibrillation is treated by digitalis

and not quinidine, which may accentuate it. Septic foci may be dealt with before thyroidectomy in relatively mild cases, but are better left until after thyroidectomy in severe cases. Rectal avertin and local anaesthesia are the anaesthetics of choice.

Post-operative treatment consists of rectal salines containing 1 drachm of Lugol's iodine and bromides; continuous inhalation of oxygen in an oxygen tent or B.L.B. mask (since thyrotoxic patients utilize oxygen rapidly and show a depression of arterial blood oxygen saturation after thyroidectomy); digitalis for fibrillation, but if the rhythm is not normal after six days, quinidine is given; in crisis, in addition to the above, Lugol's iodine, min. 100 daily, is given intravenously, and morphia, hyoscine, or barbiturates are advocated for combating restlessness.

Treatment with Thiourea and Thiouracil.—E. B. Astwood⁷ based some clinical experiments on similar animal experiments by Mackenzie and others (1941–43). In certain animals, thiourea and thiouracil produce a lowering of the basal metabolic rate and hyperplasia of the thyroid gland, the latter being an attempt at compensation for the inhibition by these drugs of the formation of the thyroid hormone. In 4 normal people thiourea and thiouracil had no effect; in 3 patients with thyrotoxicosis, after a latent period of one to two weeks, there was a decrease in the basal metabolic rate, an increase in blood cholesterol and of the body weight, together with an improvement in the clinical condition. The size of the thyroid gland was unchanged or increased. However, in one case, thiouracil produced a severe agranulocytosis with an associated clinical crisis, and in another case thiourea produced a severe rash. The dosage of thiouracil was 0.2 to 0.6 g. daily, and that of thiourea 0.5 to 2 g. daily. These clinical experiments are certainly of interest, but they are experiments, and the danger signs are too serious for extended therapeutic trials to be undertaken lightly. H. P. Himsworth⁸ has, however, confirmed this work in 6 cases of thyrotoxicosis which all benefited from thiourea without toxic complications.

Roentgen-ray Treatment.—M. H. Soley and R. S. Stone⁹ treated 43 patients with thyrotoxicosis by radiation therapy. Of these, 25 patients were clinically cured within nine months, and 8 were markedly improved. The average basal metabolic rate fell from +35 per cent to -2 per cent; 3 patients were lost touch with; 2 patients died of heart failure; and 5 patients were subsequently operated upon. There was no evidence that radiation made operation technically more difficult, and in one of the 5 cases radiation was intentionally used as a preparation for thyroidectomy to render the patient a better surgical risk. The portion of thyroid gland removed showed pronounced fibrosis, destruction of much of the acinar tissue, and thickening of the small vessels; 3 of the 5 patients who underwent thyroidectomy after previous radiation developed myxoedema, and the authors give a warning that the surgical operation should not be too radical in these cases, as the effect of radiation may be delayed many months. Twelve of the 43 cases were examples of toxic nodular goitre, and although they are differentiated in the consideration of results, the authors favour surgery for nodular goitre "because neoplastic nodules cannot be distinguished from involutionary nodules by palpation". They also record that exophthalmos is less likely to be aggravated by radiation than by thyroidectomy, Soley having observed an increase in exophthalmos in no less than 55 per cent of patients with toxic diffuse goitre treated surgically [this appears to be a very high figure]. Complications of radiation such as tracheitis and oesophagitis were obviated by improved technique.

REFERENCES.—¹*Lancet*, 1942, 2, 385; ²*Arch. intern. Med.* 1942, 70, 206; ³*Quart. J. Med.* 1942, 11, 229; ⁴*Surg. Gynec. Obstet.* 1942, 75, 357; ⁵*Quart. J. Med.* 1942, 12, 129; ⁶*S. Afr. med. J.* 1943, 17, 117; ⁷*J. Amer. med. Ass.* 1943, 122, 78; ⁸*Lancet*, 1943, 2, 465; ⁹*Arch. intern. Med.* 1942, 70, 1002.

PLATE XXXVII

GOITRE INCISIONS

(F. H. LAHEY)

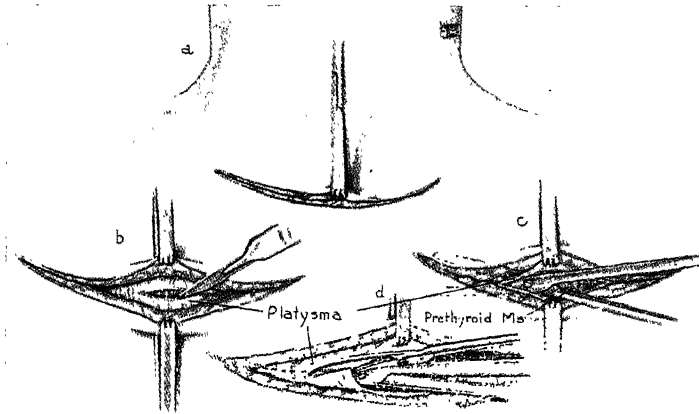


Fig. A.—*a*, Method of marking out the incision partly through the skin and not penetrating the entire thickness of the skin. *b*, The incision is deepened until the platysma can be demonstrated and incised in the midline. *c*, Metzenbaum scissors are inserted beneath the platysma to separate it from the prethyroid muscles. *d*, The platysma separated from the underlying structures is now incised with scissors; this maintains intact the layer of adipose tissue between skin and platysma muscle.

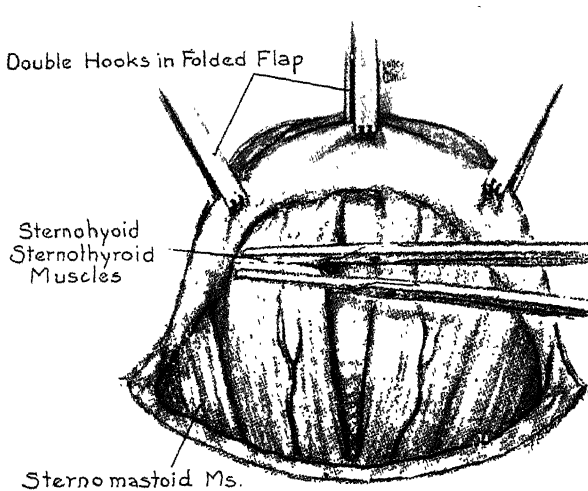


Fig. B.—The method of grasping the double fold of upper skin flaps to facilitate its upward dissection well above the high level at which the prethyroid muscles are cut in order to avoid destroying their innervation and to stagger the muscle suture and skin suture at different levels.

Plates XXXVII, XXXVIII reproduced from the 'Annals of Surgery'

PLATE XXXVIII

GOITRE INCISIONS—continued

(W. H. LAHEY)

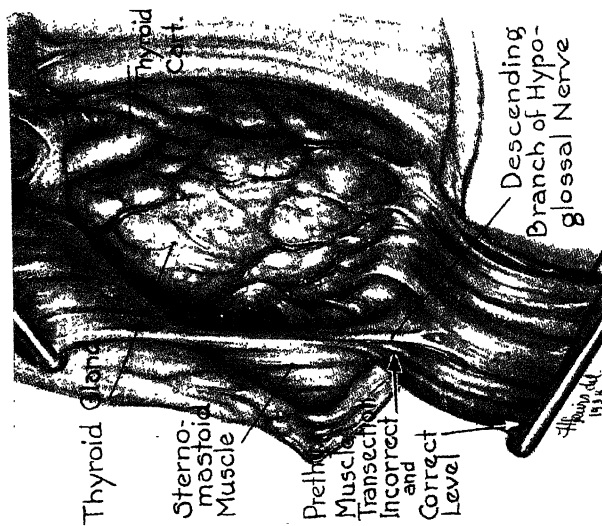


Fig. C.—Innervation of the prethyroid muscles by the descending branch of the hypoglossal nerve at the point at which it is injured when the incision is incorrectly made at a lower level.

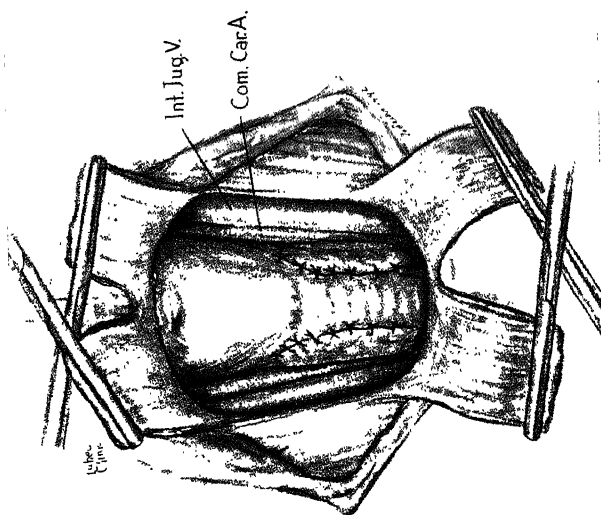


Fig. D.—The method, repeatedly demonstrated by the author, of suturing the remaining stump of thyroid against the trachea to overcome oozing and thus permit closure of the wound without drainage.

THYROID SURGERY.*Lambert Rogers, M.Sc., F.R.C.S.*

Thyrotoxicosis.—Those of us who remember the surgery of thyrotoxicosis in the days before iodine was administered preliminary to operation, need no convincing of the great value of iodine medication in reducing the risk of operation. Because of its general use to-day and the fact that late and neglected cases now rarely come to the surgeon as a last resort, staggered surgical procedures such as ligations of arteries or partial resection to reduce thyroid activity by degrees, with the object of minimizing any post-operative flare reaction, are but rarely required. Preliminary ligation of the thyroid arteries is now very seldom needed, and the reviewer, who at one time was in the habit of ligaturing the inferior artery as a stage operation in highly toxic cases whose reaction to operation was obviously going to be great, has not now performed a ligature operation for some years. Occasionally, however, it is still advisable to perform stage operations by removing only one lateral lobe at a time. This may be required for highly toxic cases in which a severe post-operative reaction is anticipated, or in those cases in which at the time of operation the patient's condition or technical difficulties, e.g., resulting in greater loss of blood than usual, make it advisable to defer removal of the second lobe to a second stage.

W. C. Sealy and H. B. Kernodle,¹ of North Carolina, advocating a two-stage procedure in certain cases, point out that it is difficult to describe the indications for a two-stage operation, as so much depends on clinical observation and judgement, but in their Clinic the two-stage operation is performed whenever pre-operative studies of the patient indicate the probability of a severe post-operative reaction. They advocate a short interval—10 or 12 days—between the resections of the two lobes in preference to the 6 weeks or so which in their earlier experience they allowed to intervene and which is customary with many surgeons. They claim that not only is the patient's basal metabolic rate lower 10 days after a lobar resection than it is at the end of six weeks, but that the operation is easier and that with the employment of ultra-violet radiation there is very little danger of infection from opening the wound for the second stage. They use silk throughout at both operations and do not employ drainage at either time.

Anæsthesia.—Oliver Cope and C. E. Welch² of Boston point out that adequate oxygenation in thyrotoxicosis is a paramount consideration and a free air-way must be maintained no matter what the anæsthetic agent. If local infiltration with procaine is used adrenaline should not be added, as the thyroid hormone sensitizes the heart to adrenaline and the likelihood of fibrillation is thereby increased. Oxygen, nitrous oxide, and ether are alternatives to local analgesia with basal narcosis. Cyclopropane may induce ventricular fibrillation in patients with thyrotoxicosis and is therefore contra-indicated, and avertin likewise, because it produces inadequate oxygenation and may cause liver damage. [For some time now the reviewer has depended on local analgesia with procaine and rectal paraldehyde in highly toxic cases and nitrous oxide and oxygen in non-toxic or only mildly toxic cases. In a recent case, for example, a very highly toxic diffuse goitre in a young woman, operation was performed under novocain with rectal paraldehyde. Her condition was such that it was decided to resect only the right lateral lobe: six weeks later she was so much better that gas, oxygen, and ether was used for removal of the left lobe.—L. C. R.]

Goitre Incisions.—In a paper with this heading, F. H. Lahey³ gives the result of his experience of 22,000 goitre operations. Nothing, he writes, plays a greater part in the happiness of a patient operated upon for goitre than the post-operative appearance of the incision. The accompanying figures from his paper (*Figs. 29, 30, and Plates XXXVII, XXXVIII*) indicate the correct and incorrect ways of making goitre incisions. He emphasizes the value of the surgeon standing with his back to the patient's head when he makes the incision, and throughout

this paper draws attention to minor but highly valuable points in technique, which are well worthy of consultation by the thyroid surgeon. Drains are rarely employed in the Lahey Clinic nowadays.

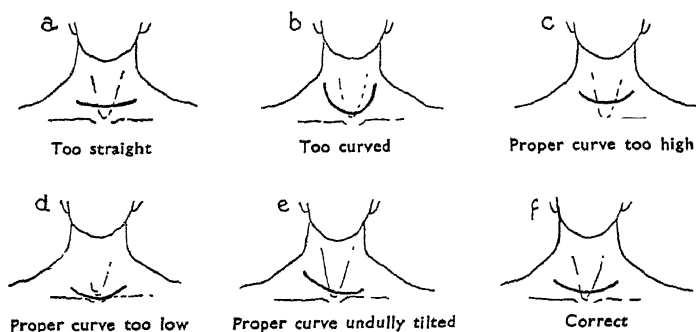
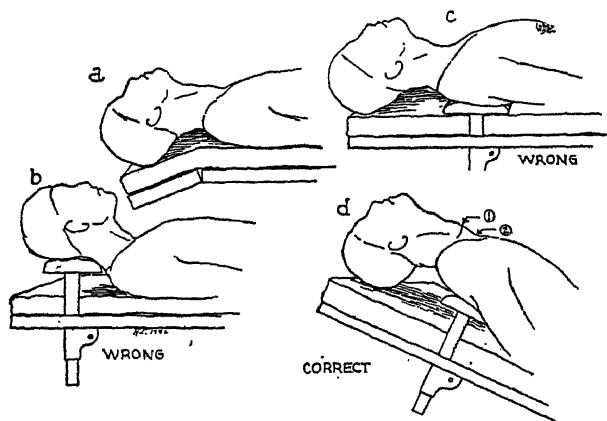


Fig. 29.—Showing various types of incisions employed for removing a goitre. (Figs. 29, 30 reproduced from the 'Annals of Surgery'.)



30.—a, The forward projection of the neck is inadequate when the head is 1 over the end of the table. b, The goitre bar improperly placed beneath the neck, flexion of the neck on the wound. c, The goitre bar properly placed well down beneath the shoulder-blades. d, The goitre bar properly placed beneath the shoulder-blades; forward projection of the thyroid can be obtained by elevating the chest; arrow 1 shows where the incision must be made if it is eventually to be located at the point indicated by arrow 2, to which it will slip when the goitre bar is let down.

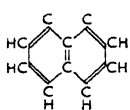
Amyloid Goitre.—This can be but little more than a pathological curiosity, but G. A. Walker¹ of Kansas City has recently described 2 cases, one in a man aged 60, the other in a boy aged 16, each of whom had pulmonary tuberculosis. Walker finds 56 previously recorded cases, and notes that none showed thyroid insufficiency. He points out that amyloid infiltration of the thyroid is sometimes associated with fatty infiltration of the gland also. The amyloid change produces the typical iodine staining of a mahogany-brown colour. During life the condition may be mistaken for malignant disease.

REFERENCES.—¹*Ann. Surg.* 1943, 117, 263; ²*New Engl. J. Med.* 1942, 227, 870; ³*Ann. Surg.* 1943, 117, 332; ⁴*Surg. Gynec. Obstet.* 1942, 75, 374.

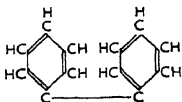
TOXICOLOGY.

R. St. A. Heathcote, D.M., F.R.C.P.

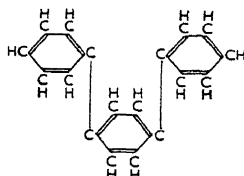
Poisoning by Chlorinated Derivatives of Naphthalene, etc.—Any or all of the hydrogen atoms in naphthalene, $C_{10}H_8$, can be replaced by chlorine, thus producing a series of compounds from mono- to octo-chloronaphthalene. Similarly, from diphenyl, $C_{12}H_{10}$, another series can be obtained from mono- to deca-chlorodiphenyl, and from diphenyl-benzene, $C_{18}H_{14}$, a third from mono- to tetradeca-chloro-diphenylbenzene.



Naphthalene



Diphenyl



1 : 4-Diphenyl-benzene

While many of these compounds have been known chemically for a considerable time, their practical use in industry seems to date only from the last war, when the Germans, being very short of rubber, started using them as substitutes for insulating purposes. As they form solid waxy substances, very resistant to water, to heat, and to electricity, and are non-inflammable, they are very suitable for such use. Many of them, such as the tri-, tetra-, penta-, and hexa-chloronaphthalenes, generally as impure mixtures, have therefore found wide application in the electrical industry in recent years.

From the earliest days of their use, it was observed that a form of acne was very prevalent among those handling the molten, but not the cold, material or those exposed to its fumes. At first, chlorine itself was incriminated and the condition was known as "chloracne", but it is now recognized that the responsible agent is the chlorinated hydrocarbon. The effect is almost certainly due to a *local* action on the sebaceous glands in the skin, and not to a *general* action after absorption.^{1, 2} It only occurs with exposure to the substances in a state of fine sub-division, as in fumes from the molten material or as in dust. Since 1941, poisoning, or its sequelæ, by these substances has been added to the list of scheduled Industrial Diseases.

While acne itself is unpleasant, it is not very serious, though some cases have been reported³ in which damage to the deeper layers of the skin, with consequent scarring and disfigurement, has been brought about. In general, however, it may be expected that good workshop conditions, e.g., improved ventilation, using the molten material at a temperature as little above the melting-point as is practicable, together with careful personal hygiene on the part of the employees, will reduce the incidence of acne very considerably. Certain classes of persons, however, are more liable to suffer from it than others, e.g., those with seborrhœa.

In recent years, however, a much more serious condition has occurred in connection with these compounds, namely, acute, or subacute, *necrosis of the liver*. At least 9 deaths have been reported in the U.S.A.⁴⁻⁷ and 5 in Great Britain.² Experimentally, Lehmann⁸ found that rats, given these substances by mouth or by inhalation, went off their feed and, post mortem, showed pathological changes in the liver. Flinn and Jarvik^{4, 5} gave 15 mg./kg. doses of several of these naphthalene derivatives to rabbits subcutaneously. While the trichloro derivative proved innocuous, mixtures of the tetra- and penta-, and of the penta- and hexa-chloro compounds killed all the animals by the 15th and 26th day,

respectively. Severe liver necrosis was found in nearly all of them. Drinker and his colleagues^{6, 9} studied the action of a similar set of these compounds, given by inhalation and/or by mouth to rats. The series included: trichloro- with a little tetrachloro-naphthalene; tetra- and penta-chloronaphthalene; penta- and hexa-chloronaphthalene; a substance believed to be a diphenyl derivative, either alone or mixed with the two last-named substances. (Later work¹⁰ showed that this alleged diphenyl compound was in fact a mixture of a diphenyl with a diphenylbenzene derivative, with about 65 per cent by weight of combined chlorine.) The trichloro compound was found to produce little effect unless high concentrations of its vapour were used. All the other mixtures, however, produced serious liver damage. Though a chlorinated compound of diphenyl, specially prepared, was relatively innocuous, the diphenyl-benzene derivative was found to be very toxic. Although the livers of most of the animals used were very seriously injured and although the damage persisted for a long time, two months at least, after exposure had ceased, none of the animals actually died of acute yellow atrophy of the liver. It was thought that many workmen might have reached some similar condition but that an additional affection of the liver might be needed to cause acute yellow atrophy to develop. With this in view, single doses of carbon tetrachloride, far too small in themselves to kill, were given to rats, the livers of which might be expected to have been injured by the chlorinated compounds. A very large proportion, up to 90 per cent, of such animals died very quickly with necrotic livers. Calcium administration is known to protect the liver from the effects of carbon tetrachloride, and sodium xanthine has been credited with the same power. Neither, however, was of any avail in these experimental animals.

These experiments certainly indicate that, while the chlorinated hydrocarbons are in fact toxic either by inhalation or by ingestion, the cases of acute yellow atrophy are not due to them alone. This is perhaps borne out by the capricious incidence of this very serious condition in man. Greenburg, Mayers, and Smith⁷ recommend that a certain selection of workmen should be made for this industry, with the exclusion from it of any persons in whom there is any reason to believe that there may be, or have been, any possibility of affections of the liver, e.g., a previous history of jaundice, present treatment with any potentially hepatotoxic drugs, such as the arsphenamines, or, but of course temporarily only, pregnancy. It seems quite probable that such a selection might reduce the incidence of acute yellow atrophy, without necessarily abolishing it completely. In Collier's case, for example, there is no mention of previous liver damage, though he is inclined to regard an old-standing heart lesion as the exciting cause.²

REFERENCES.—¹Jones, *J. industr. Hyg.* 1941, 23, 290; ²Collier, *Lancet*, 1943, 1, 72; ³Mayers and Silverberg, *J. industr. Hyg.* 1938, 20, 244; ⁴Flinn and Jarvik, *Proc. Soc. exp. Biol., N.Y.* 1936, 35, 118; ⁵Flinn and Jarvik, *Amer. J. Hyg.* 1938, 27, 19; ⁶Drinker, Warren, and Bennett, *J. industr. Hyg.* 1937, 19, 283; ⁷Greenburg, Mayers, and Smith, *Ibid.* 1939, 21, 29; ⁸Lehmann, *Kurzes Lehrbuch der Arbeit und Gewerbehygiene*, 251, S. Hirzel, Leipzig, 1919 (cited by Drinker et al.); ⁹Bennett, Drinker and Warren, *J. industr. Hyg.* 1938, 20, 97; ¹⁰Drinker, *Ibid.* 1939, 21, 155.

TRICHINIASIS.

Ralph M. F. Picken, M.B., Ch.B., B.Sc., D.P.H.

W. H. Wright, K. B. Kerr, and L. Jacobs,¹ bring together the results of the post-mortem examinations of human diaphragms over several years in the U.S.A. Their own series comprised 5313 individuals belonging to 41 States and the district of Columbia. *Trichinella spiralis* was found in 855, or 16.1 per cent. Omitting 200 Jews, among whom only one was positive, raises the percentage positive to 16.7. There is no significant difference between town and country or between different regions or among individuals coming to section in various ways. Most of the infections were light (11 larvæ per gramme), but 4.5 per cent of the positives were over 50 larvæ per gramme. Most of

the infections over 10 per gramme were in persons over 54 years of age. Dead larvæ predominated. Apart from this series 6618 examinations reported by other workers have revealed trichinellæ, when adjustment is made for difference of technique, in 16.4 per cent. Taken together, therefore, larvæ have been identified in 16.2 per cent of 11,931 examinations. There is no reasonable doubt that re-infection occurs, and that previous infection does not protect against acquisition of or death from re-infection. Infection is obviously much more frequent than is revealed by ordinary clinical and post-mortem examinations.

REFERENCE.—¹*U.S.A. publ. Hlth. Serv., publ. Hlth. Rep.* 1943, 58, 1293.

TRYPANOSOMIASIS.

Sir Philip Manson-Bahr, C.M.G., D.S.O., M.D., F.R.C.P.

TREATMENT.—E. M. Lourie¹ has published a valuable paper on the results obtained by him in the treatment of *gambiense* sleeping sickness by various drugs, including the aromatic diamidines. The work was carried out in the Kailahun district of Sierra Leone. The outbreak was one of four to five years' duration and in parts the infection-rate was as high as 20 to 30 per cent.

Treatment by *antrypol* (1-g. doses) and *tryparsamide* (2-g. doses) was frequently followed by severe toxic effects. These arose in cases treated by either drug alone, but were particularly frequent and severe in a combined course of 3 *antrypol* doses, followed by 5 of *tryparsamide*—all injections being made at five-day intervals. Such a combined course is usually more severe than a regimen of one *antrypol* followed by 9 *tryparsamide* doses again at five-day intervals, in spite of the fact that the latter course involved injection of nearly twice the amount of *tryparsamide*. After treatment by *tryparsamide*, or by *antrypol* followed by *tryparsamide*, the incidence of serious visual disturbances varied from less than 0.5 per cent in cases where there had been 0.4 cells per cm. in the cerebrospinal fluid at the start of the treatment to nearly 6 per cent of cases in which the initial count had been over 100 per c.mm.

Injections of aromatic diamidines (*stilbamidine*, *pentamidine*, and *propamidine*) usually produce severe and sometimes alarming immediate reactions, associated with pronounced fall in blood-pressure which passes off within half an hour, but there were no later toxic effects comparable with those encountered after *antrypol* and *tryparsamide*. In fact there were no late toxic results. It is considered that it is a distinct advantage of these compounds that they may be given in daily injections. The most intensive course was 100 mg. *pentamidine* daily for 12 days (in 80 cases).

Figures are given showing the proportion of cases in which 5–6½ weeks and 4–5 months respectively after start of the treatment by different types of drugs, there was a change in the cerebrospinal fluid cell-count of the following order:—

a. An increase to more than 10, where during the course of treatment it had been 0.4 per cmm., or to more than double the initial count where this had been above 4 per cmm.

b. A decrease to less than the square root of the count at the start of treatment where this had been above 20 per cmm.

The changes in cerebrospinal fluid cell-counts, together with the results of a clinical follow-up investigation 12–20 months after treatment, warrant the conclusions that:—

a. In early cases the curative properties of *pentamidine* or *propamidine* are less than those of *tryparsamide* (given alone or preceded by injections of *antrypol*). *Stilbamidine* is of considerably less value.

b. In late cases *tryparsamide* is much more effective than the three diamidines.

REFERENCE.—¹*Ann. trop. Med. Parasit.* 1942, 36, 113.

TUBERCULOSIS, PULMONARY. (*See also* MASS RADIOGRAPHY OF THE CHEST IN RELATION TO PULMONARY TUBERCULOSIS; RADIOLOGY)*Maurice Davidson, M.D., F.R.C.P.*

Erythema Nodosum in Relation to Tuberculosis.—The significance of erythema nodosum in connection with tuberculosis and tuberculo-allergy has long been a subject of interest; its inclusion among the so-called para-tuberculous lesions has been recognized by many, especially since the advocacy of this view by W. R. F. Collis¹ in 1932. Further evidence of the relation between the two conditions has been provided by studies of the Mantoux reaction, numerous instances having been recorded of the development of a positive reaction shortly after an attack of erythema nodosum in a negative reactor.

Peter Kerley² has thrown a good deal of fresh light on this subject by a series of observations on the radiological manifestations of erythema nodosum with special reference to its aetiology. His first communication (1942) gives detailed reports of 12 cases, a later one (1943) is based on study of 37 adult cases with an average age of 21. In 75 per cent of his cases serial radiography and tomography revealed evidence of gross intrathoracic changes consisting of massive enlargement of the bronchial glands, with or without changes in the lung parenchyma. The latter, where present, were of two types: (a) reticulation, (b) miliary nodulation. In Kerley's opinion all aetiological factors in erythema nodosum can be excluded except tuberculosis, streptococcal infection, and Boeck's sarcoidosis, and from the radiological evidence which he brings forward it would appear that it is the last of these three which is mainly responsible; as he expresses it, "the relationship between erythema nodosum and Boeck's sarcoidosis, although not absolutely proven, is certainly probable". Of the 12 cases in his first report there seems no reasonable doubt that 9 were not tuberculous. In the other 3 there is presumptive evidence of tuberculous infection—e.g., one developed radiological evidence of rarefaction in the right sacro-iliac joint, one showed ultimate calcification in a hilar lymph-node, and a third developed widespread miliary infiltration of the whole of both lungs. Discussing the literature dealing with the radiographic appearances of tuberculous mediastinal glands, Kerley makes the interesting observation that both radiographic and post-mortem evidence shows that such enlargement is usually only moderate in the Nordic races. He quotes 11 proved cases of tuberculous mediastinal adenitis, all having a demonstrable lung lesion, and all exhibiting tubercle bacilli either in the sputum or in the gastric contents. None of these cases showed an enlargement of the bronchial glands comparable with that seen in erythema nodosum and sarcoidosis. This seems an important point; Kerley notes that of 11 cases in the Prophit survey 9 showed gross bronchial gland enlargement identical with that seen in erythema nodosum and sarcoidosis; in 2 cases in which the enlargement was only moderate and unilateral there was a history of gross exposure to infection from close contact with a tuberculous patient, and it was assumed that in these two the condition of the glands was in all probability tuberculous. These studies are of considerable interest and importance. Although they do not exclude tuberculosis as a possible aetiological factor in erythema nodosum, the findings appear to have been much more conclusive when checked against sarcoidosis. Although in four instances Kerley found the characteristic radiological appearances of a calcified primary complex, follow-up studies of his series of adult cases showed that none developed post-primary tuberculosis.

Immunity in Tuberculosis.—An interesting report is given by J. Solem³ on the demonstration of a tuberculin-anegetic condition in a young adult who was suffering from active pulmonary tuberculosis. This patient, aged 23, was admitted to a sanatorium on account of hæmoptysis, and was found to have an

exudative lesion of the right upper lobe with a cavity, and a slight degree of infiltration in the left upper lobe. Tubercle bacilli were demonstrated in a direct smear of the sputum. The Pirquet test was negative (0—0 mm.); the Mantoux test also was negative with 1.3 mg. and 5 mg., read 48 and 72 hours afterwards. A right-sided pneumothorax was induced, adhesions being subsequently cauterized, and the collapse of the lung was maintained by the usual technique. During pneumothorax treatment the cavity in the right lung was seen to disappear; the condition of the contralateral lung remained stationary, bacilli disappeared from the sputum, and the patient remained afebrile. Tuberculin tests were repeated at 2-monthly intervals and showed continuously negative results with doses up to 10 mg. tuberculin (Mantoux). Subcutaneous injection of 3 mg. tuberculin also produced no reaction. Inoculation of the sputum into guinea-pigs caused the death of the animals from generalized tuberculosis. Eight months after the induction of the pneumothorax this patient was vaccinated with B.C.G. (Rosenthal's method), two controls being tested at the same time with the same vaccine, one a tuberculin-allergic individual, the other a normal tuberculin-anergic individual. The patient after vaccination reacted 2 days later with fully developed 2-mm.-wide papules; the Mantoux test remained negative. The tuberculin-allergic control reacted after vaccination more intensely in the same manner. The tuberculin-anergic control behaved quite differently, no local changes occurring in the vaccination punctures until 12 days later; then papules were seen, which were, however, smaller and paler than in the two other B.C.G.-vaccinated persons.

The author suggests (a) that tuberculin-allergy may disappear entirely during active pulmonary tuberculosis which is improving, and (b) that the interdependence of immunity on allergy is not as certain as many authors have believed. He regards his case as an example of a clinical picture of *iatergic immunity* (original italics) such as has been demonstrated by Birkhaug in desensitized tuberculous animals.

Blood Sedimentation in Pulmonary Tuberculosis.—The value of the erythrocyte sedimentation rate as an index of prognosis has always been a matter of some controversy and of not a little scepticism. G. Day⁴ has worked out a method of measuring in standard units the substances which are responsible for corpuscular agglutination in the blood of patients suffering from destructive disease processes. This consists of plotting the "Cutler's curves" described by a sedimenting 200-mm. column of citrated blood and ascertaining the logarithm of the maximum constant velocity achieved during the fall. This he has shown to be directly proportional to the concentration in the blood of the substances causing agglutination, which for convenience he calls "sedimentin". The "sedimentin index" of a sample of citrated blood is, in the author's standard technique, expressed in *units* as the logarithm of its maximum constant velocity per 100 minutes. Day gives details illustrating the "progress charts" of 3 cases selected out of 350 to indicate the value of serial 'sedimentin' indices in reflecting the course of different patients' progress. It is interesting to note that the Westergren readings have been found by him to bear no ascertainable relation to the 'sedimentin' content.

The objections to the well-known methods of determining the sedimentation rate and the limits of the value thereof as a guide to prognosis have always been admitted, even by those who employ the test regularly. Attempts have been made from time to time to amplify the principle, one of the most notable being that of L. E. Houghton,^{5, 6} who showed the advantage of a composite blood index (hæmogram) based on the E.S.R., the lymphocyte-monocyte ratio, and the von Bonsdorff count, over the ordinary E.S.R. *per se*; Day's 'sedimentin index' appears to have a really rational and mathematical basis, and the

discussion at the end of his paper on the results of his observations is stimulating. His account of this method should encourage an extended trial on a large scale.

Plasma Viscosity in Pulmonary Tuberculosis.—Another test involving observation of changes in the blood is advocated by A. K. Miller and R. B. Whittington,⁷ who have shown that in sedimentation tests with controlled cell-volumes at constant temperature the maximum velocity is largely dependent on the agglutinating power of the plasma, and that this power can be demonstrated as a complex function of the plasma viscosity. They suggest that plasma viscosity may form a useful clinical index which would have advantages over the E.S.R. They have made estimations of the kinematic viscosity coefficient of the plasma in 63 tuberculous patients, 1 surgical case, and 12 healthy controls, and find that these give a good indication of the severity of pulmonary tuberculosis.

Blood Groups in Pulmonary Tuberculosis.—M. Weinberger⁸ has made a survey of the blood-group distribution in 1000 cases of pulmonary tuberculosis and 117 cases of non-pulmonary tuberculosis. This was not found to differ substantially from that of the normal population, due account being taken of regional variations. Of the various types of pulmonary disease as indicated by the X-ray appearances exudative lesions seemed to occur in higher proportion in Group O patients, the fibrotic lesions being frequent in Group A and most frequent in Group B. The highest incidence of cavitation (62.93 per cent) was observed in Group O, a lower proportion (54.26 per cent) in Group A, and the lowest (49.39 per cent) in Group B. The incidence of bilateral cavitation was highest among Group O cases. Investigation was also made into the relation between blood grouping and the occurrence of hæmoptysis. Those patients (208 cases) that exhibited moderate and severe types of hæmoptysis showed the following distribution: Group O, 20.61 per cent; Group A, 18.48 per cent; Group B, 28.91 per cent; Group AB, 30.76 per cent. Cases with only slight staining, which comprised the majority, were more frequently seen in Group O; the least frequent being those in Group B. Weinberger thinks that these observations seem to indicate that tuberculous patients belonging to Group B or Group AB were more prone to bleeding. As regards the relation between bleeding and cavitation, he concludes that there is no interdependence, but that blood-grouping B and AB may constitute a predisposing factor to hæmoptysis. Some interesting points were noted in regard to patients discharged during the period of these observations. The incidence of Group O was very low in comparison with that of other groups in patients discharged under the heading "no further treatment required", most of whom were returning to their ordinary occupation. In the "dispensary supervision" class a similar state of affairs was observed. The mortality-rate in relation to blood-grouping was also determined, calculations being made for each blood group (a) on the basis of total patients typed (1117), (b) on the basis of discharged patients only, in both instances over a period of twelve months. The fatality-rate in Group O was found to be 6.13 per cent and 12.25 per cent, that in Group A being 4.77 per cent and 9.46 per cent respectively. In conclusion, while the author could not confirm any difference of susceptibility in connection with blood groups, he thinks that differences do seem to exist with regard to the course of the disease, the prognosis in Group A patients appearing to be more favourable than that in Group O.

Tuberculous Tracheo-Bronchitis.—The importance of tuberculous disease of the trachea and bronchi is receiving increasing attention as its significance in pulmonary tuberculosis appears to be assuming greater proportions. Its relation to surgical treatment was reviewed in the last edition of the MEDICAL ANNUAL (p. 364), since when numerous publications have been received dealing

with various aspects of this subject. So much is involved in these observations that has a bearing upon differential diagnosis, prognosis, and treatment that further study and consideration of the subject by chest physicians is inevitable. The diagnostic problem is well illustrated in a paper by E. B. Benedict,⁹ in which the author, after pointing out that among the most frequent causes of bronchial obstruction are carcinoma, benign tumour, and tuberculosis, emphasizes the likelihood of error in diagnosis based on clinical and radiological evidence alone, and insists on the need for bronchoscopy with biopsy or smear to establish a positive diagnosis. Attention to the radiographs which accompany this article is sufficient to show, what is not yet sufficiently widely recognized, the ease with which a tuberculous broncho-stenosis may be mistaken for a malignant obstruction. Three main forms of tracheo-bronchial tuberculosis are described: first, the ulcerative giving rise to diffuse or circumscribed loss of mucosa; second, the hyperplastic in which there is proliferation of the submucosa, with occasional formation of conglomerate tubercles; third, the stenotic in which there is definite scar-tissue formation leading to partial or complete bronchial obstruction.

The significance of these lesions is made clearer by a statistical survey furnished by D. Salkin, A. V. Cadden, and R. C. Edson,¹⁰ who have studied a group of 125 consecutive autopsies on cases dying from pulmonary tuberculosis over a period of four and a half years side by side with a control group of 622 consecutive admissions observed during the same period of time. Space forbids more than a brief review of this important article, which will repay careful study, but some of the salient points may be noted. In the 125 necropsies tuberculous lesions of the trachea and of the large- and medium-sized bronchi were present in 50 cases (i.e., in 40 per cent). The authors observe that this phenomenon was influenced by three factors, namely, the predominant character of the disease, its lobar location, and the sex of the patient. Exudative cases showed the highest incidence of tracheo-bronchitis, mixed cases the next highest, fibroid cases the least. They note a high incidence of bronchitis in lower-lobe disease, and find that the age of the patient and the duration of the disease have no significance. One of the main objects of this study has been to obtain a more complete understanding of the natural history of tuberculous tracheo-bronchitis with special reference to incidence, course and progress, and prognosis. Tuberculous bronchitis was found to heal spontaneously in about 80 per cent of all cases in which the parenchymatous lesion was controlled and inactivated. Cases with bronchitis were found to exhibit a more severe clinical course and to have a less favourable prognosis than those with normal bronchi. Further statistics are supplied by C. Huang¹¹ in a study extending over a period of five and a half years. In a series of 115 cases which died from active pulmonary tuberculosis the proportion in which tuberculous tracheo-bronchitis was present was 42.7 per cent, and when the laryngeal lesions were added to these the incidence was 50.4 per cent. Numerous references are available from both these papers.

The implications of the facts elucidated by the above research are obvious, and such as may well necessitate a radical revision of many of our present conceptions of the treatment of active pulmonary tuberculosis. The management of cases complicated by lesions of the tracheo-bronchial tree is discussed by T. N. Rafferty and D. O. Shields¹² with special reference to pneumothorax therapy. Three main general conclusions form the basis on which they suggest the general course of treatment best calculated, in their opinion, to control the parenchymatous lesions with the least likelihood of producing bronchial occlusion. First they observe that collapse procedures interfere to varying degrees with bronchial drainage, pneumothorax to a considerable degree, thoracoplasty but little. Second, the serious complications with collapse therapy are far

more frequent during the acute phase of the bronchial disease. Third, the choice of collapse technique, when collapse is indicated, should depend primarily upon the type and extent of the bronchial disease. They lay considerable stress on the presence or absence of bronchial tuberculosis in relation to artificial pneumothorax therapy, and the following table, showing a summary of the results of treatment in 40 unselected cases in which bronchial disease was demonstrated by bronchoscopic examination, gives figures which should provide food for very serious reflection.

SUMMARY OF 40 CASES IN WHICH PNEUMOTHORAX WAS USED
(*Rafferty and Shields*¹²)

Discharged as apparently arrested	13 (32.5 per cent)
Discharged as quiescent	7 (17.5 per cent)
Uncontrolled, still hospitalized	3 (7.5 per cent)
Died	17 (42.5 per cent)

The cases quoted in the above series included only those which showed definite ulceration or stenosis; borderline cases with slight erosion or redness were not considered. The authors add that of the discharged patients (20 in all) 9 appeared to have an unexpandable lung. Of this group 14 had bronchial disease which was of very limited extent or which showed rapid response to local treatment; in only 6 was there stenosis or extensive ulceration which had not shown a tendency towards regression.

The difficulties which may arise from the various complications of artificial pneumothorax therapy are too well known to those who have to deal with large numbers of cases to need elaboration. The anxieties which they occasion to operator and patient alike are such that one hesitates more than once before accepting the prospect of further complication of the technique, which is often difficult enough in the management of these cases. At the same time, the research that has been carried out in the last few years on this important feature of the question cannot be ignored, and may well result in a considerable modification of the routine commonly adopted in many pneumothorax clinics in this country, and indeed in our whole conception of the management of phthisical cases in which the initiation of collapse therapy is under consideration. The conclusions of Rafferty and Shields are based upon a careful survey of cases which have been subjected to a most detailed examination; they demand the most serious attention and consideration. In view of the serious complications of pneumothorax which, in their experience, are most likely to occur in cases with extensive and especially with acute bronchial tuberculosis, they suggest that pneumothorax therapy is in these circumstances contra-indicated, and that thorocoplasty is the method of choice. They regard the severity of the bronchial disease, and especially its management, as exercising more influence on the prognosis than the stage of the disease in the lung itself, and they make a great point that for this reason the primary aim of the treatment should be the maintenance of adequate bronchial drainage.

A. H. Aufses¹³ reports a case of upper lobe bronchiectasis associated with tuberculous endobronchitis, and discusses the part played by this bronchial complication in the production of bronchiectasis in cases of pulmonary tuberculosis. It is interesting to note that in this case, in which bronchiectasis and suppuration of the upper lobe occurred, the tuberculous lesion of the lung itself was not greatly in evidence in the earlier stages of the patient's illness. The clinical details and the X-ray reproductions in this report are of the greatest interest and importance in the light of what has been said earlier in our review of this disease. Of still further interest is the fact that this patient eventually submitted to a successful lobectomy.

Tuberculosis in Adolescents and Young Adults.—Research in the last few years on the incidence of primary tuberculous infection and its sequelæ has led to a considerable increase in our understanding of one of the major problems presented by this national disease, and has made clear many essential points in its natural history which may well form the main basis on which in the future our practical policy may be founded. F. Ridehalgh¹⁴ has published a preliminary analysis of the Prophit survey, which summarizes the main results of an investigation carried out over a period of 5 years preceding the outbreak of the present war. The subjects of the investigation were mostly between the ages of 15 and 25, but they include a few children between 12 and 14, and a very few adults between 26 and 30. The 5968 cases in the survey were divided into five groups: (1) "Volunteer controls", apparently normal healthy office and factory workers (1543); (2) Contact cases (784); (3) Hospital nurses (1476); (4) Medical students (1247); (5) Boys entering Royal Naval training establishments (918).

The tuberculin used for the Mantoux test was the International Standard synthetic medium old tuberculin supplied by the Medical Research Council; (initial tests with 1–10,000 tuberculin were read after 48–72 hours, and repeated if necessary with dilutions up to 1–100). Full-size X-ray films were used for all radiological records. Mantoux tests and chest X-ray examinations were ordinarily repeated annually on each individual in the survey, up to a maximum of 5 examinations.

Ridehalgh's brief communication, which is a summary of the detailed report presented to the Royal College of Physicians, is full of valuable statistics and should be carefully studied. Two salient examples may be quoted: First, the following results were obtained from radiological examination of the 1543 persons from the volunteer control group. Radiological lesions suggestive of 'adult' pulmonary tuberculosis were found in 13 (i.e., 0.84 per cent) at the first examination, radiological evidence of calcified primary complex in 110 (i.e., 7.2 per cent). Second, the examination of hospital nurses revealed some interesting and significant details, 953 nurses being taken from voluntary, 523 from municipal, hospitals. There was considerable excess of Irish and Welsh in the municipal group compared with the voluntary hospital group. Of the entrants to voluntary hospitals 11.5 per cent were Mantoux-negative reactors (approximately the same as in the female control group of the same ages); of the entrants to municipal hospitals the negative reactors comprised 17.8 per cent (a figure significantly higher than that for either the control group or the voluntary hospital nurses). Comparison of Irish municipal hospital nurses with other nurses in the same hospitals showed a definite excess of negative reactors, e.g., 25 per cent (other municipal hospital nurses 14 per cent, control group 9 per cent).

A recapitulatory account of the work carried out in the research department of the Brompton Hospital during the last 14 years under the Halley-Stewart bequest has recently been issued by A. M. C. Macpherson,¹⁵ correlating the observations of 7 previous reports with a summary of the most recent conclusions formed in the Children's Contact Department of the Hospital. Foremost amongst these is the vital importance and seriousness of the problem of "*symptomless adolescent pulmonary tuberculosis*", and the plea for the induction of a shallow artificial pneumothorax as providing a more satisfactory solution than the more conservative methods usually adopted. The suggestion is one which many may regard as somewhat revolutionary, and in fact the publication of this report has already aroused a certain amount of controversy. The authors admit that it is as yet impossible fully to assess the value of this line of treatment, but they advocate its trial as an alternative to other methods which

in their experience are unsatisfactory in their final results or impracticable for the majority of patients.

Tuberculosis and War.—The literature on this subject is extensive and is likely by the end of this war to have assumed enormous proportions. Three recent publications may be mentioned which give a readable and succinct account of the essentials of this subject up to date. Sir Arthur MacNalty,¹⁶ in the Malcolm Morris Memorial Lecture for 1942, has given an excellent summary of the development of the National Tuberculosis Service, which is followed by reviews of the position during the war of 1914–18, during the intervening period of peace, and during the present war. His lecture covers so much ground that it has been impossible to deal with the numerous aspects of the subject with anything but a bird's-eye view. This, however, is one of the chief merits of the paper, which is nothing if not comprehensive; it forms a very helpful preface to other monographs less easy to digest and for this reason to be recommended for its clarity and very readable style.

W. A. Daley and B. Benjamin¹⁷ contribute a most instructive statistical study of tuberculosis in London in war-time. Among the factors influencing the incidence of tuberculosis they include changes in the age and sex distribution of the population resulting from evacuation and recruitment to the Forces; strain and overcrowding from bombing; fatigue and lack of rest; and on the other hand increased employment and financial resources for those formerly on the verge of poverty. The rate of occurrence of new cases of pulmonary tuberculosis in 1941 as compared with 1938 is shown to have increased by 43 per cent, that of non-pulmonary tuberculosis by 15 per cent. The increase affected children much more than adults, especially in the non-pulmonary type. The importance of contact and droplet infection in London is suggested by the fact that new cases of pulmonary tuberculosis increased more in adults than new cases of the non-pulmonary disease. It is of interest to note that in these two particulars—(a) the greater increase in children, and (b) the preponderance of adults over children as regards the new cases of the pulmonary type—the experience of London has differed from that of Glasgow.

F. R. G. Heaf and N. L. Rusby¹⁸ have followed their former review of 1941 by a second commentary on tuberculosis in war-time. This article, though inevitably restricted in space, is very comprehensive, and deals in no uncertain tones with many of the problems which call urgently for attention and investigation. From the figures compiled it is evident that in the authors' words "there is a considerable amount of infection among the general population and that the children are coming into contact with it". They lay stress on the increase in non-pulmonary deaths (mostly due to meningitis) as suggesting either a large infecting dose or a lowering of resistance, either or both of which factors may have been operative in the first half of 1941, when, as they point out, the nightly bombing of large towns made contact infection probable and frequent. They regard the rise in the figures for tuberculous meningitis as a special indication for intensive search for foci of infection, and suggest a campaign to examine the sputum of all in-patients and out-patients in all hospitals throughout the country.

The difficulties of tuberculosis nursing, already existent in pre-war days, and aggravated by the circumstances of this war, are discussed, and practical suggestions offered as to the lines on which these may be remedied. The subject of rehabilitation is reviewed, the main points involved in a comprehensive system being admirably outlined. The problems raised by infection in air-raid shelters, and the question of nutrition, are summarized and constructive criticisms offered. This paper is an excellent contribution and should be studied by all serious students of this disease.

REFERENCES.—¹*Quart. J. med.* 1932, 1, N.S., 141; ²*Brit. J. Radiol.* 1942, 15, 155, and 1948, 16, 199; ³*Acta med. scand.* 1942, 112, 435; ⁴*Lancet*, 1943, 2, 99; ⁵*Tubercle, Lond.* 1931–2, 13, 385; ⁶*Brit. med. J.* 1936, 2, 1246; ⁷*Lancet*, 1942, 2, 510; ⁸*Brit. J. Tuberc.* 1943, 37, 68; ⁹*New Engl. J. Med.* 1942, 227, 1013; ¹⁰*Amer. Rev. Tuberc.* 1943, 47, 251; ¹¹*Ibid.* 500; ¹²*J. thorac. Surg.* 1943, 12, 225; ¹³*Ibid.* 285; ¹⁴*Lancet*, 1942, 2, 463; ¹⁵*Brit. med. J.* 1943, 2, 98; ¹⁶*Tubercle, Lond.* 1942, 23, 263; ¹⁷*Brit. med. J.* 1942, 2, 417; ¹⁸*Tubercle, Lond.* 1942, 23, 107.

TUBERCULOSIS, PULMONARY, IN CHILDHOOD.

Reginald Miller, M.D., F.R.C.P.

War-time Incidence.—The incidence of pulmonary tuberculosis is to some extent an index of the national nutrition, and is therefore apt to rise in war-time. In the House of Lords on July 28, 1942, Lord Dawson stated that the mortality from tuberculosis had increased 13 per cent in Great Britain since the war, and that a novel feature in this war had been the increase of deaths from tuberculous meningitis in young children. Of this latter group it is estimated by F. M. B. Allen in Belfast that 72 per cent are infected by the human type of bacillus.

The Chief Medical Officer to the London County Council has reported that the death-rate from pulmonary tuberculosis in 1941 as compared with 1938 has increased by 442 per cent in children from birth to 4 years of age, and by 340 per cent in children between 5 and 14 years of age (A. Daley and F. Benjamin¹). Such figures, taken at their face value, can hardly be explained except by a breakdown in the proper segregation of infectious adults, and appear as a blot on our administrative methods. As far as the reviewer is aware, these figures remained for a year uncontested, although it was pointed out by the authors in their paper that their significance depended on the accuracy of population estimates. Quite recently G. Lissant Cox² suggests that we should be on firmer ground if we discard death-rates and take the actual number of deaths which are irrespective of estimates of population. He then proceeds to show that the actual increase in the number of deaths from pulmonary tuberculosis in London in children up to 15 years of age was from 55 in 1938 to 66 in 1941, and adds that the corresponding figure for 1942 was 39 deaths. What, one wonders, do statistics mean—if anything?

Early Diagnosis of Tuberculosis in Children.—A valuable report on this subject has been prepared for the British Pædiatric Association by W. Sheldon, S. Graham, W. Gaisford, and R. Lightwood.³ The methods of investigation needed for the early diagnosis of intrathoracic tuberculosis in children are given as follows:—

a. Clinical Examination.—An examination of the whole child is required, as the symptoms of intrathoracic tuberculosis may also arise in other conditions, e.g., chronic dyspepsia, chronic infections in the upper respiratory tract. It must be acknowledged that however thorough the clinical examination, the diagnosis of intrathoracic tuberculosis by clinical examination alone presents great difficulty, and is indeed often impossible.

b. Tuberculin Skin Tests.—Whatever test is employed, whether the Mantoux intra-dermal test or the Vollmer patch test, their importance in the diagnosis of tuberculosis in young children is undoubted, and is fully accepted by pædiatricians. Although these tests, as with all other investigations, are liable to technical errors, and the significance of a positive reaction varies with the age of the child, the technique is relatively simple, and the significance of a positive reaction, at any rate in young children, is straightforward. It is our opinion that the value of these tests in children is in general under-rated and that because of this many infected children escape diagnosis at a stage of their disease when recovery should be possible. We wish to emphasize that these tests should be used far more widely, and recommend that every facility for carrying them out should be placed at the disposal of medical officers in charge of child welfare clinics, and of school medical officers.

c. *X-ray Examination of the Chest*.—An indifferent X-ray of the chest is worse than useless, as it may actually be misleading. Although it is impossible to get far with the investigation of child contacts without X rays, their efficient use demands three qualities: First, the apparatus must be sufficiently powerful to take a good picture with a short exposure, for young children may neither lie still nor hold their breath. Second, the radiographer needs to be experienced in the handling of children if satisfactory films are to be obtained without waste of material. Third, the interpretation of the film must be made by someone conversant with the picture of tuberculosis as met with in childhood; in practice, the opinion of a radiologist, provided he has had particular experience in the subject, would be of great help to the physician—whether pædiatrician or tuberculosis officer—in his full assessment of any individual case.

d. *Gastric Lavage for the Discovery of Swallowed Tubercle Bacilli*.—Whilst the finding of tubercle bacilli in sputum is of supreme diagnostic importance in an adult, this is not the case with children, who only seldom expectorate. To postpone the diagnosis of intrathoracic tuberculosis in a child until tubercle bacilli have been found, would be courting disaster for the patient. Tubercle bacilli can sometimes be recovered from gastric washings in a tuberculous child, and this examination is of particular value in infants, in whom the technique is relatively easy, and also in an older child, if there is reason to suppose that he or she is disseminating infection. Unlike the previous investigations, the examination of gastric washings entails admission to hospital, but is only required in a few selected cases.

e. *Erythrocyte Sedimentation Rate*.—This test, which is not strictly an aid to diagnosis, is of value when estimating the degree of activity of a tuberculous lesion. By repeating the test at intervals, a useful indication is given of the progress of the lesion. Seeing that the sedimentation rate is influenced by other infections, the test may be misleading unless a complete clinical examination has been made.

Should special clinics for the examination of child contacts come into being, they ought to be equipped, and the personnel trained, so that the above investigation could be efficiently carried out—with the possible exception of examination of gastric washings, for which special facilities would be required.

Some comments on this valuable section of the report may be made. As regards X-ray examinations of the chest, the value of an early film, although implied, might be more emphasized. Such a film, taken perhaps during a period of indefinite ill-health, may be invaluable in later examinations, for in doubtful cases the alterations in the films may be of more diagnostic value than the abnormalities detected in any single film. Also the possible misinterpretation of films taken within a month of any catarrhal condition of the chest must be borne in mind. The recovery of the tubercle bacilli by means of gastric lavage is of undoubted value in children, but they should be identified by culture as well as by microscopical examination. All acid-fast bacilli are not tubercle bacilli. As regards readings of the erythrocyte sedimentation rate, it should be remembered that this is the one thing to which children object most strongly (as well they may!), and it is to be questioned whether it is necessary to use this test merely as a routine in institutions where monthly re-examinations by X rays can be carried out.

Co-operation between Pædiatricians and Tuberculosis Officers.—The B.P.A. report enters a strong plea for this type of co-operation, which, it says, broadly speaking, does not exist at present. The following suggestions are offered:—

a. Special clinics for the investigation of child contacts are required. Whenever possible these should be set up at children's hospitals, or in the children's department of general hospitals, because it is here that the necessary facilities

are available, e.g., radiographers experienced in X-raying children, X-ray apparatus suitable for children, in-patient accommodation for special investigations if required, and the services of a visiting pædiatrician. It would also avoid the attendance of children at an adult tuberculosis clinic, where unless special precautions are taken, or a special session is reserved for children, the risk of their becoming infected is great.

b. The children who should attend these clinics would be discovered through the machinery of the tuberculosis officer.

REFERENCES.—¹*Brit. med. J.* 1942, 2, 417; ²*Ibid.* 1943, 2, 780; ³*Arch. Dis. Childh.* 1943, 18, 157.

TUBERCULOSIS, PULMONARY: SURGICAL ASPECT. (*See also* PNEUMON-ECTOMY.) *A. Tudor Edwards, M.Ch., F.R.C.S.*

Lobectomy and Pneumonectomy.—From time to time when lobectomy has been performed for bronchiectasis, tuberculosis has been found to be present in the excised lobe. In many of these cases, although the early result has been satisfactory, eventually spread of the tuberculous process ensues into the residual lobe of the same side or to the contralateral lung, to which the patient finally succumbs.

T. F. Thornton and W. F. Adams¹ have reviewed the results to be expected, and made an interim survey of the indications and contra-indications for the operations. They record 29 cases of pneumonectomy and 46 cases of lobectomy, including 5 of their own patients, collected from the published literature. The lesions for which pneumonectomy was performed were: (1) Stenosis of a main bronchus causing atelectasis or bronchiectasis with fever, toxicity, and poor drainage—13 cases; (2) Inability of thoracoplasty to collapse the cavity—5 cases; (3) Mistaken diagnosis of tumour—5 cases; (4) Intractable hæmorrhage—2 cases; (5) Mistaken diagnosis of bronchiectasis—1 case; (6) Reason not stated—3 cases. Of the total of 29 cases, 8 (27·58 per cent) died within three months of operation, mostly from tuberculous spread to the remaining lung tissue or in the pleura. A further 5 patients (17·24 per cent) died after three months, all from spread of tuberculous disease. Twelve patients (41·38 per cent) are in a satisfactory state, although 4 have a small sinus, and a further 3 patients (10·34 per cent), although alive, have spreading disease and are unlikely to survive for long.

The conditions for which lobectomy was done are in roughly somewhat similar proportions, although bronchiectasis was most prominent. There was a total of 51 lobectomies, of whom 13 are dead (25·49 per cent); 9 of these (17·64 per cent) died within three months of operation, and 4 (7·84 per cent) died after three months; almost all these patients died from spread of the tuberculous disease. Thirty-eight patients (74·61 per cent) survive, in 35 of whom the condition is satisfactory from four months to three years—68·62 per cent of the total. The most common complications following pneumonectomy have been: (1) Persistent sinus or fistula in 34·5 per cent; (2) Contralateral spread in 24·1 per cent; and (3) Empyema in 17·2 per cent. Following lobectomy: (1) Persistent sinus or fistula in 39 per cent; (2) Spread of disease in 25·5 per cent; and (3) Empyema in 25·5 per cent.

These figures disclose certain other facts which have a definite bearing on the cases which might be deliberately submitted to radical surgery. Thus in 16 patients in whom a tumour was diagnosed, 15 were alive and only 3 showed evidence of spread. These proved to be tuberculomas or localized lesions not discharging tubercle bacilli into the bronchial tree. In fact, the authors go so far as to put this group among the indications, for two reasons, the first being the difficulty of diagnosis from tumours, and the second the probability that

they will not remain dormant indefinitely. Twelve patients were diagnosed pre-operatively as bronchiectasis in spite of repeated examinations of sputum for tubercle bacilli, and 3 only developed an extension of their tuberculosis.

In open tuberculosis, on the other hand, pneumonectomy and lobectomy gave rise to a 50 per cent mortality.

Twenty-one cases of bronchial stenosis are included in the series, and 7 patients who died and 1 survivor developed tuberculous complications. These authors conclude that the most common indications for operation have been: (1) tuberculoma and isolated lesions simulating tumour; (2) tuberculous bronchiectasis; (3) bronchial stenosis; and (4) post-thoracoplasty cavities. Further they qualify these indications by stating that only cases of stenosis in which drainage of secretions through the stricture is prevented should be submitted to lung resection, and that external drainage of post-thoracoplasty cavities is preferable to lobectomy or pneumonectomy. In other words, lung resection is hazardous in the presence of a positive sputum.

E. D. Churchill and R. Klopstock² hold the view that in as rapidly developing a field as thoracic surgery impressions drawn from past experience are notoriously misleading. In criticism of the afore-mentioned paper they point out that the great majority of cases recorded had their operations performed under erroneous diagnosis; in other words, "the pre-operative estimate of the situation and consequently the time of operation and the technics employed were not in terms of the pathology of tuberculosis."

In Churchill's view it seems desirable to present new evidence regarding what may be accomplished at the present time and not be content to accept a conclusion based on the disasters and prejudices of the past. Any discussion of total pneumonectomy in tuberculosis is intentionally omitted despite a relatively large and favourable personal experience with the procedure, as the principles that introduce total pneumonectomy into the treatment of tuberculosis are totally different from those that underlie lobectomy. Circumscribed by strict indications total pneumonectomy in tuberculosis may be a life-saving operation when no other procedure is feasible.

Lobectomy is proposed as a highly selective measure for dealing with certain unilobar lesions, being far more conservative of pulmonary function than even a seven-rib thoracoplasty. Compared with artificial pneumothorax lobectomy is an irreversible procedure, and can be suggested as an alternative only when tuberculosis has produced irreversible or irreparable destruction of lung substance. In such cases artificial pneumothorax therapy is faced with the dilemma of either maintaining the collapse indefinitely or facing reactivation by withdrawal.

Six successful lobectomies are recorded by these authors, of which the first three would be accepted as offering set indications. The others showed unilobar disease with cavitation, in one case associated with a cavity on the contralateral side subsequently treated by artificial pneumothorax. In all cases the post-operative course was uneventful except that one patient developed a transient pleural effusion, which became reabsorbed within a few weeks.

Three forms of healing of cavities can be differentiated: (1) The solid focus due to retention, inspissation, and final calcification of the cavity contents; (2) Radiating scar; (3) The bronchiectatic area remaining after the substitution of caseous and tuberculous elements in the cavity wall by ordinary granulation tissue, with subsequent epithelialization and fibrous shrinking of the space. As the cases had been treated by some form of collapse therapy, pneumothorax and thoracoplasty, it follows that such treatment may convert the open cavity into a closed one that may still maintain a caseous focus. Likewise, Churchill, in careful studies on a relatively large number of surgically removed lobes and lungs, found that all specimens have shown one type of cavity residuum, the

healed focus. These well-walled-off foci, although firm in consistence, invariably contain caseous material, which does not appear to be a permanent and safe method of cavity healing. These observations add weight to the proposal that irreparable damaged lobes should be resected.

The authors add certain points connected with lobectomy for tuberculosis: (1) All patients are subjected to bronchoscopy to rule out the presence of active ulceration of trachea or bronchi; (2) Anæsthesia by gas, oxygen, and ether through an intratracheal tube; (3) Postero-lateral incision at the appropriate level; (4) In densely adherent parts dissection is carried from intrapleural level to extrapleural plane; (5) Meticulous hæmostasis by ligature and silver clips; (6) The frequently repeated statement that access to the hilum may be blocked by tuberculous infiltration of lymph-nodes is erroneous; (7) The phrenic nerve is crushed to reduce temporarily the volume of the hemithorax; (8) The chest is not drained; (9) Fluid and air are removed by subsequent needle aspiration.

In the opinion of the authors "lobectomy is more highly selective than thoracoplasty and as selective as the most skilfully managed pneumothorax, assuming in the latter instance that healing and re-expansion are prohibited by the actual pathology." The anatomy of the thoracic cage is preserved apart from the immediate ablation of the lesion.

Obviously the patient's immunological equilibrium must be restored by sanatorium treatment. After this period is passed, if there is good reason to believe that a re-expanded lung with a closed lesion cannot be attained within a reasonable time, lobectomy may be considered. A method of treatment that combines conservation of lung function with immediate conversion of sputum and a shortening of the span of treatment cannot be dismissed until its scope has been fully explored.

REFERENCES.—¹*Surg. Gynec. Obstet.* 1942, **75**, 312; ²*Ann. Surg.* 1943, **117**, 641.

TUBERCULOSIS SURVEYS.

Ralph M. F. Picken, M.B., Ch.B., B.Sc., D.P.H.

Infection of Children in a Rural County.—A comprehensive tuberculin survey of school children in Radnorshire has been made by T. E. Jones Davies.¹ The method used was the patch test with Monrad double-strength tuberculin jelly. Of the 2437 elementary school children in the county, 2176, or 88 per cent, were tested, only 2 per cent refused examination, the rest being absent from school. The number of reactors was 141, or 6.5 per cent. The incidence was higher on the average in the urban areas (10.8 per cent) than in the rural (3.8 per cent). Environmental and social conditions in the county are described as including poor housing, bad sanitation, inadequate feeding, high rainfall, low sunshine, low mean temperature, exposure to rain-bearing winds, impervious soil causing dampness, susceptible anthropological types, and exposure to fatigue; and yet evidence of having contracted infection was infrequent. In the rural districts the incidence was low in spite of atrocious housing and sanitary conditions, while it was as high as 10.7 per cent in Llandrindod Wells with good housing and sanitation, compared with the small town of Presteigne, where these conditions are bad, but only 3.6 per cent were positive. The number of reactors coming from bad houses was low, but from fair and good houses surprisingly high. There was practically no difference in the nutritional assessment of reactors and non-reactors; in fact it was noticeable that apparently neglected children from poor homes were almost never positive. *One adverse factor was common to the large majority of reactors—close contact with a case of pulmonary tuberculosis.* The low general incidence is probably due to the sparseness of the population, involving a high degree of segregation, especially for the poorer rural people. Detailed accounts are given in 33 instances of the accidents of

exposure which broke this segregation and led to infection, some of them of the most casual kind and of short duration. Bovine infection is regarded as rare, since only 2 per cent of cattle have been found to be reactors, only 5 cows have been slaughtered as tuberculous in 4 years, and all school milk is boiled.

Infection with Bovine Type Tubercle Bacilli in Wales.—E. M. Williams and R. L. Milne² have collated the results of several years' laboratory examinations and post-mortem findings in relation to the occurrence of tuberculosis of bovine origin. Their material consisted of: (1) cerebrospinal fluids from all parts of Wales from 1924 to 1942, mostly from meningitis occurring as a terminal event following established disease in some other system; (2) post-mortem specimens from children dying of tuberculous meningitis at a general hospital in 1940 and 1941; and (3) the post-mortem records from 1929 to 1943 of this hospital. In the first group 115 cultures were typed, of which 9 (7·8 per cent) were bovine. Since 1936, 11 per cent have been bovine, but the proportion under 16 years of age was 24 and under 5 years 33 per cent. There has been no significant change in these proportions during the war-time rise in meningitis. The second group, which consisted of 12 children aged 3 years or less, was equalled divided as between human and bovine types. All infected with the bovine type had their primary infection in the abdomen; the human types came from 4 thoracic, 1 abdominal, and 1 probably cervical primary case. The hospital post-mortem records of 14 years contain 72 deaths from tuberculous meningitis, from which 19 adults have been excluded and 3 children have been omitted because of incomplete data. Of the remaining 50 under 16 years of age, 36 were thoracic and 14 abdominal primaries. Assuming 80 per cent of abdominal infections to be bovine, 22 per cent of all these cases of meningitis would be of this type. If regard is taken only of those dying under 5 years of age, the probable bovine proportion was 30 per cent, but during 1940–41 it was 46 per cent as compared with 21 per cent in 1929–39. The incidence of bovine infection has therefore not improved, but rather the reverse.

X-ray and Laboratory Findings in Australian Recruits.—R. Webster³ has analysed the records of 1548 recruits to the fighting-services of Australia whose X-ray examinations of the chest showed abnormality suggestive of tuberculosis. Further investigation included examination of bronchial sputum or stomach contents. If X rays revealed active tuberculosis, the presence of acid-fast bacilli in smears was regarded as diagnostic. All others were submitted to culture and animal inoculation. Results have shown that the error of accepting acid-fast bacilli as tubercle bacilli, within this scheme, is small. Tubercle bacilli were found in 364 cases, or 23 per cent. Of 192 positives from gastric contents 173 were determined by culture. Among those in whom X rays revealed activity (505 cases) tubercle bacilli were found in 54 per cent; doubtful activity (237 cases) 14 per cent; old, healed, or inactive lesions (374 cases) 6 per cent; doubtful tubercle (224 cases) 9 per cent. To this latter high percentage of positives in doubtful X-ray cases has to be added 4 cases examined bacteriologically although showing no X-ray signs at the time, 3 of whom had positive sputum and 1 a positive gastric culture. The author considers that infectivity cannot be excluded by X-ray examination alone, that the bacilli may persist in old calcified lesions, and that human carriers may occur. Among the 364 positive recruits, only 175, or 48 per cent, gave any personal or family history suggestive of the disease.

X-ray Findings in Industrial Groups.—L. Banskzy⁴ summarizes the results of fluoroscopic examinations of employees in the English and Continental branches of a large works. In suspected cases confirmation was by clinical, radiological, and laboratory methods. The actual number of employees is not given. Among entrants to the English factory pulmonary lesions were found in 4·1 per cent,

of which 0.51 were regarded as having active tubercle, 0.58 doubtfully active, and 2.8 inactive. The rate for men was lower in England than in Holland, but the reverse was the case for women. The highest rate was found among workers in the Belgian branch, next in England, and lowest in Holland. Of active cases sent to sanatorium only 15 per cent returned to work at the factory, but some may have entered other employments. Two of the 9 cases who returned to work relapsed. Of doubtful cases 10 per cent showed improvement in signs, while 6 per cent deteriorated during the five years covered by these observations.

Practical Problems.—In a discussion on the control of tuberculosis, in which R. C. Wingfield, C. Banks, R. R. Trail, and J. B. McDougall⁵ took part, the following points were made: There is probably a reservoir of 250,000 infectious persons, recognized or unrecognized, in Britain. Compulsory segregation is impracticable. The unknown established cases can only be found by the general practitioner. Early infections can be detected by mass radiography. Mantoux reactions indicate that infection is becoming less common, and hygiene, improved housing conditions, and home-contact supervision will help to accelerate this movement. Standards for offices and shops should be laid down as for factories. The tuberculosis officer should not concentrate on clinical and technical to the neglect of social work. It is difficult to use a sputum flask in public, but patients should be trained in the dangers of spray during coughing or speaking, and as to the disposal of food-remnants and the disinfection of dishes and food utensils. The economic circumstances of patients requiring institutional treatment and training must be alleviated, so as to bring about a measure of voluntary segregation. This involves a large increase in institutional accommodation. Even where poverty and other environmental factors are unfavourable, as in Cyprus, tuberculosis need not assume serious proportions so long as mass infection is controlled.

In this connection it should be noted that the Ministry of Health⁶ is putting 18 plants for mass radiography at the disposal of certain local authorities in widely distributed regions of Britain. Provision is also made of special allowances, at basic rates of 27s. for an adult and dependant rates ranging from 5s. to 12s. per week according to age, with supplements for rent and fuel, in the case of gainfully employed persons suffering from pulmonary tuberculosis at a stage likely to benefit from treatment who accept approved treatment.

REFERENCES.—¹*Radnor C.C., spec. Rep. of M.O.H.* 1943; ²*Tubercle, Lond.* 1943, **24**, 113; ³*Med. J. Aust.* 1943, **2**, 61; ⁴*Lancet*, 1942, **2**, 693; ⁵*Proc. R. Soc. Med.* 1942, **36**, 39; ⁶*Min. Hlth. Memo.* 266/T, 1943, April.

TYPHOID FEVER. (See ENTERIC FEVER.)

URETER, SURGERY OF.

Hamilton Bailey, F.R.C.S.

Ureteric Implantation.—C. H. Neuswanger¹ advocates sulphaguanidine to sterilize the intestinal tract properly when implanting the ureters into the bowel. [Sulphasuccidine is better for this purpose. I have employed it in these cases on the advice of W. B. Gabriel.—H. B.]

Ureteric Meatotomy.—J. C. Ainsworth-Davis² praises Ogier Ward's knife pattern ureteric meatotome for enlarging the ureteric meatus. The instrument is shown in *Fig. 31*. The acorn-ended meatotome is passed into the ureteric orifice for 1.5 cm. By pressing the knob the knife will cause a tent-like fold of the intramural portion of the ureter to become apparent. A touch on the foot switch will cause the knife to present (*Fig. 32*). With the current on, gentle traction of the cystoscope will result in division of the wall of the ureter as far as its orifice (*Fig. 33*). [When it is impossible to insert a catheter up the ureter,

and particularly when the cause of the obstruction is a mass of sulphonamide crystals (*see* p. 31), meatotomy in the manner described above might prove of considerable value. In the absence of a ureteric meatotome, a fine diathermy electrode might serve.—H. B.]

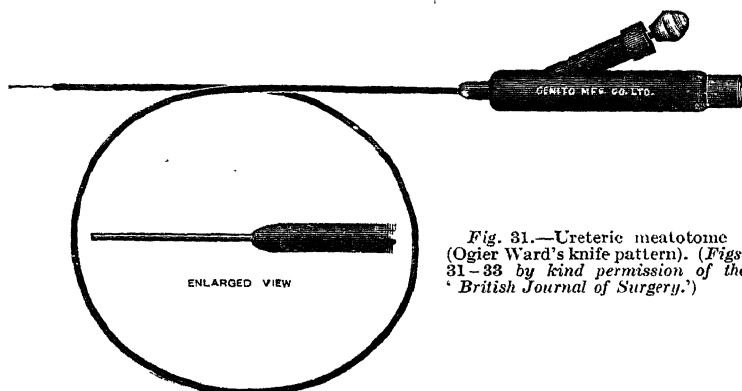


Fig. 31.—Ureteric meatotome (Ogier Ward's knife pattern). (Figs. 31–33 by kind permission of the 'British Journal of Surgery'.)

J. C. Ainsworth-Davis² has found Welland Howard's spiral stone dislodger described in the *MEDICAL ANNUAL*, 1938, of considerable value in cases of stones impacted in the lowest part of the ureter, when used in conjunction with a ureteric meatotomy. A special cystoscope is necessary to accommodate the stone dislodger.



Fig. 32.—Meatotomy in progress.

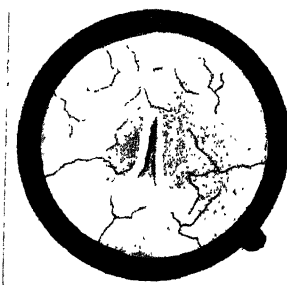


Fig. 33.—Meatotomy completed; correct line of ureteric orifice restored.

Cutaneous Ureterostomy.—Cutaneous ureterostomy for the relief of intolerable pain and frequency of advanced tuberculous cystitis continues to be advocated. W. A. Dakin³ has found that it afforded relief over a period of years to patients with a hopelessly contracted tuberculous bladder. The technique F. H. Colby⁴ employs is the same as that described in the *MEDICAL ANNUAL*, 1937, with one exception. After the ureter has been brought to the surface and intubated and the operation virtually completed, the protruding portion is split and turned down to meet the edges of the skin incision. The ureter and skin are then joined with as few unabsorbable sutures as are necessary for approximation. Colby has found this better than allowing the protruding portion of the ureter to slough at skin level. In this way accurate anastomosis of the skin with

the ureter is encouraged without the hit-and-miss chance afforded by allowing the protruding portion to slough. The whole object is to get a rosette of mucosa above skin level, and if this is achieved, the patient need not wear a catheter, the urine being collected in a rubber bag. If the ureter sloughs off below skin level, a catheter in the ureter is essential, for stricture formation will otherwise ensue. Those patients who have had to use catheters have been distinctly less comfortable than those who have survived without catheters.

REFERENCES.—¹*J. Urol.* 1941, 46, 885; ²*Brit. J. Surg.* 1943, 31, 34; ³*Canad. med. Ass. J.* 1942, 47, 207; ⁴*J. Urol.* 1942, 48, 357.

URETHRA, SURGERY OF.

Hamilton Bailey, F.R.C.S.

Rupture of the Urethra.—A. H. Wood¹ says that in cases of *rupture of the bulbous urethra* extravasation of blood and urine may be confined by Buck's fascia which envelops the penis. More often it permeates the bulbo-cavernosus muscle and the spread is limited by Colles's fascia. If unrelieved, it will pass upwards beneath Scarpa's fascia of the lower abdominal wall (*Fig. 34,a*). In cases of rupture of the deep urethra and extraperitoneal rupture of the bladder, extravasation of blood and urine may extend into the peri-prostatic, peri-rectal, and peri-vesical tissues, the retroperitoneal space, and the ischiorectal fossa

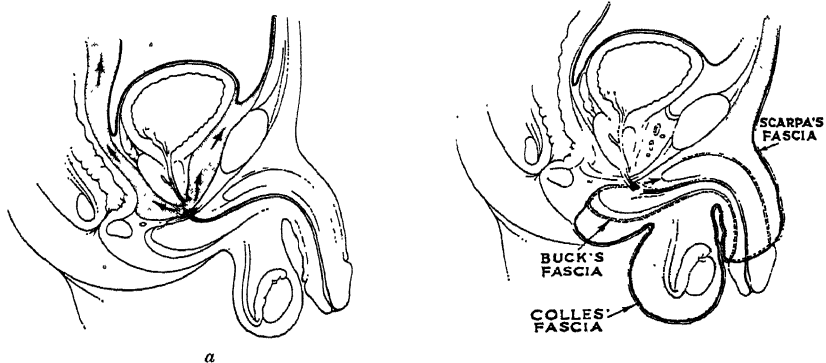


Fig. 34.—*a*, Area occupied by extravasated blood and urine in the case of rupture of the deep urethra; *b*, Area occupied by extravasated blood and urine in the case of rupture of the bulbous urethra. (After Wood.)

(*Fig. 34,b*). If the triangular ligament is torn in addition, the extravasation will then proceed along those planes which are the prerogative of the bulbous urethra.

E. N. Cook,² as a result of experience at Pearl Harbour, came to the conclusion that in extravasation of urine in war injuries, particularly those related to bomb fragments, the fascial planes are often broken and the extravasation extends beyond these planes and is frequently atypical.

J. Sandrey³ details some good practical measures for assuring apposition of the completely torn ends in cases of *intrapelvic rupture of the urethra*. After suprapubic cystostomy has been performed, the cave of Retzius is opened up sufficiently to give access to the site of rupture. After blood and extravasated urine have been removed, a Malecot catheter on an introducer is passed per urethram until the head appears in the cave of Retzius. By means of a finger in the internal urinary meatus the posterior urethra can generally be brought into such a position that the catheter can be passed through the ruptured proximal end and thence into the bladder. If this manoeuvre fails, an ordinary

rubber catheter can be passed from the bladder and its tip attached to the head of the Malecot, which is then pulled into place. Once the head of the Malecot catheter is in the bladder, a rubber washer about 1½ in. in diameter is slipped over the head of the Malecot catheter, after which the introducer is withdrawn (Fig. 35). A silk-worm-gut stitch is passed so as to include the head of the catheter and the washer, and the ends of this stitch are secured to a rod which rests on the abdominal wall. The prevesical space is drained and a suprapubic catheter inserted. Continuous urethral traction is maintained for seven days by a 2-lb. weight attached to the urethral catheter and suspended over a pulley at the end of the bed.

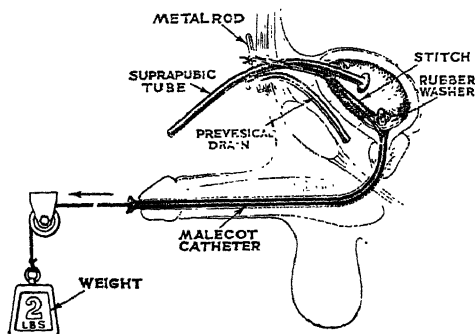


Fig. 35.—Principles in treating a complete intrapelvic rupture of the urethra. Traction maintains good apposition of the ruptured ends. (After Sandrey.)

8 cases which occurred as a result of cystoscopy, 7 from fulguration of the bladder, 7 from transurethral resection, and 4 from litholapaxy. When rupture of the bladder is suspected and the diagnosis is not obvious, a retrograde cystogram should be done at the earliest opportunity.

Urethrography in Cases of Stricture.—G. C. Prather⁵ finds that the urethra behind a stricture is dilated in less than half of the cases he examined by urethrography. He shows an excellent series of instructive urethrograms, of which Fig. 36 is an example. He advises slow but constant injection of the radio opaque medium during the time of the X-ray exposure to ensure filling the entire urethra.

Urethral Caruncle.—This is a disease of elderly females, and J. Novak⁶ believes that it is an ectropium of the posterior urethral lip caused by senile shrinkage of the anterior vaginal wall; urethral mucous membrane does not take part in the senile involution to the same degree as the vaginal lining. The mucosa having become everted, similar changes to other everted mucous linings take place, e.g., in conjunctiva or cervix. A rhombic incision of the whole of the everted mucosa, followed by careful approximation so as to narrow the urethral orifice, gives much better results than does cauterization or other incomplete methods of treatment. Novak stresses that the caruncle has nothing to do with former inflammation of the urethra or the bladder.



Fig. 36.—Long-standing inflammatory stricture in the deep bulbous urethra. (G. C. Prather.)

PLATE XXXIX

URINE TESTING AT THE BEDSIDE

(HAMILTON BAILEY)



Fig. A.—The neutral-red test for the reaction of the urine.

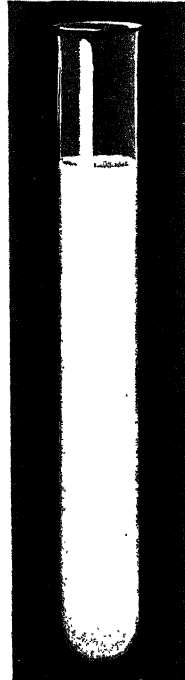


Fig. B.—The 'Scotland Yard' test for blood in the urine.

PLATE XL
TREATMENT OF VARICOSE VEINS
(E. L. FARQUHARSON)

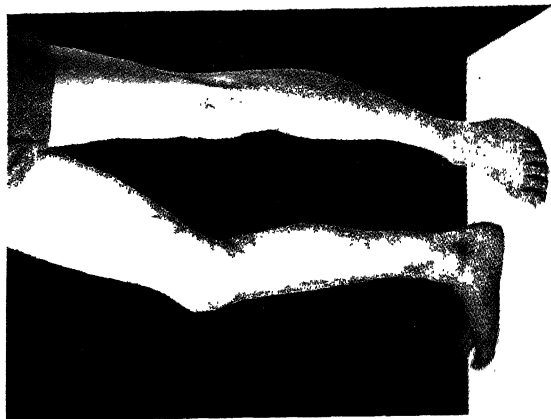


Fig. A.—Showing the extent of the varicosity.

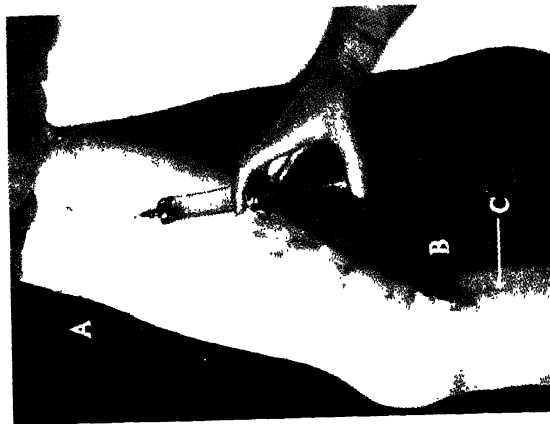


Fig. B.—Subcutaneous ligatures at A and B. The first injection was given as shown, and the second at C. 20 c.c. of 20 per cent saline was injected in each situation.

Plate XL by kind permission of the 'British Medical Journal'

G. F. McKim et al.⁷ are insistent that before the treatment by fulguration or dissection of a urethral caruncle is undertaken, the meatus should be over-dilated or, if necessary, meatotomy performed. After the removal of the caruncle, if the mucous membrane is not accurately sutured, a stricture will probably result. These authors favour excision in most cases.

REFERENCES.—¹*Surg. Clin. N. Amer.* 1942, 22, 1389; ²*Proc. Mayo Clin.* 1942, 17, 561; ³*Med. Pr.* 1943, 209, 148; ⁴*J. Urol.* 1942, 48, 266; ⁵*Ibid.* 1943, 49, 482; ⁶*Urol. cutan. Rev.* 1943, 47, 217; ⁷*J. Urol.* 1943, 49, 187.

URINE TESTING AT THE BEDSIDE: NEWER METHODS.

Hamilton Bailey, F.R.C.S.

In practising modern urinary therapeutics it is often necessary to be certain of the reaction of the urine. As it is employed so universally, many must be satisfied with the litmus paper test. When comparatively fresh litmus paper is available, the result can be relied upon if the test is carried out by the doctor himself or by a well-trained nurse. Even so, I submit that the neutral-red method I employ in urinary cases is more reliable.¹

The Neutral-red Test for Reaction.—On the patient's locker stands a test-tube supported in a home-made holder. The latter is fashioned in a few moments from a spiked paper file. In the test-tube is one inch of the patient's morning urine, to which has been added from a proper drop bottle one drop of neutral-red solution.

If the urine is acid, the urine at the top of the test-tube is unmistakably red (*Plate XXXIX, A*).

If the urine is neutral, it is pink.

If the urine is alkaline, it is yellow.

What could be simpler? There the test-tube remains throughout the twenty-four hours, reminding all concerned of some objective in the treatment of the case. To my eyes the test-tube at the side of the bed is far from unsightly. At any rate, I am sure that its presence adds to the interest and efficiency of urinary therapeutics. If the urine is blood-stained, the test is unreliable and litmus paper must be used.

The 'Scotland Yard' Test for Blood.^{2, 3, 4}—It is sometimes of great diagnostic value to know if there is blood in urine which looks clear. The practitioner will do well to develop the 'Scotland Yard' test for minute traces of blood.

Place one-quarter of an inch only of urine in a test-tube. Fill the test-tube about three-quarters full with added tap water. Shake. Add 3 drops of caustic soda solution, 40 per cent. Shake. Then add 3 drops of the reagent, which must be shaken before adding. Finally 3 drops of hydrogen peroxide, 10 vol., are added. Shake thoroughly. If blood is present, even in most minute quantities, a pale purple phosphorescent glow is produced. The luminosity (*Plate XXXIX, B*) is only seen in a fairly darkened room. A practical method is to hold the test-tube in a cupboard or under a blanket.

Formula for the reagent:—

Aminophtholic cyclic hydrazide	1 g.
Sodium carbonate	50 g.
Hydrogen peroxide (10 vol.)	50 c.c.
Aq. dest.	ad 1000 c.c.

REFERENCES.—¹*Pye's Surgical Handicraft*, 14th ed., 1944, Bristol; ²*J. prakt. Chem.* 1936, 146, 129; ³*Brit. med. J.* 1942, 2, 150; ⁴*Z. anorg. Chem.* 1937, 50, 155.

VACCINATION. (See SMALL-POX AND VACCINATION.)

VARICOSE VEINS.

Lambert Rogers, M.Sc., F.R.C.S.

As might be expected, varicose veins in the Services have provided Medical Officers with many problems relating to treatment. A War Office Memorandum¹

points out that mild aching pains after strenuous exercise or during excessive heat is not an indication for treatment of the varicose veins. Treatment should be restricted to cases in which the presence of varicose veins can definitely be held to account for marked discomfort or pain, or when the veins are increasing in size, or when they are the cause of dermatitis or ulcer. Opinions vary as to treatment, but most surgeons to-day agree that where the internal saphenous is involved and the Brodie-Trendelenburg test (see MEDICAL ANNUAL, 1940) positive, high ligation and division of the vein at its termination in the femoral vein, with thrombosis of the distal part by the injection of a sclerosing solution

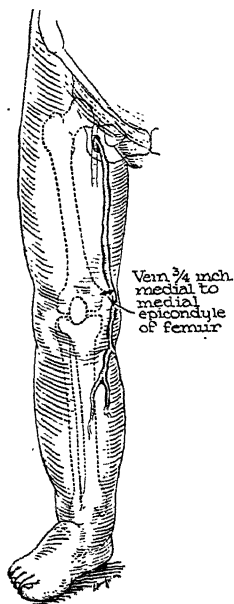


Fig. 37.

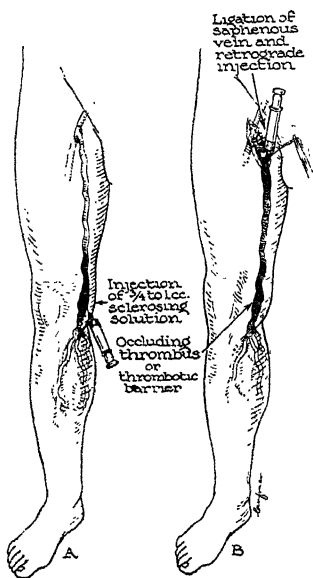


Fig. 38.

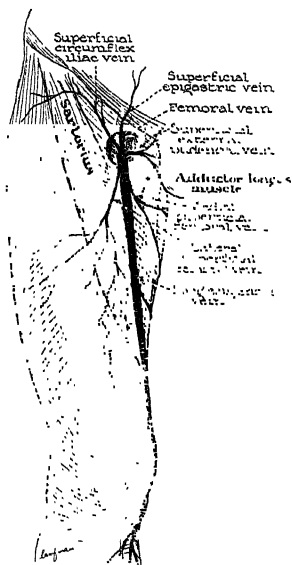


Fig. 39.

Fig. 37.—Showing the relationship of the internal saphenous vein to the medial epicondyle of the femur. (Figs. 37-39 reproduced from the 'Annals of Surgery'.)

Fig. 38.—Showing the proper location of the occluding thrombus or thrombotic barrier. The optimum location is slightly above an imaginary horizontal line bisecting the patella.

Fig. 39.—Drawing illustrating the relationship of the internal saphenous vein in the fossa ovalis to the easily palpable inserting portion of the adductor longus muscle. The vein can be felt one-half to one inch lateral to this landmark in the great majority of cases. Note the relationships of the five main tributaries. The upper two, and occasionally even the superficial femoral veins, may join the femoral instead of the internal saphenous vein.

into its divided end, is the procedure of choice. Such treatment is well established and has been discussed in detail in the MEDICAL ANNUAL, 1937, 1938, 1939, and 1940.

The desirability of high ligation so that re-establishment of the saphenous channel by way of tributaries entering the vein proximal to the ligation will not take place, has been stressed. S. L. Farquharson² and W. Goldstone³ have, however, reported satisfactory results from subcutaneous occlusion at lower levels, combined with sclerosis (Plate XL). It is suggested by these writers that although relapses may take place in time, the procedure justifies itself as a

short-term policy for the Service patient. J. T. Gault⁴ of Chicago, favouring high ligation and retrograde injection, nevertheless advocates preliminary injection of the long saphenous vein at the knee to form a local thrombus. Ligation and retrograde injection is undertaken when a firm thrombus has formed here, usually in from 10 to 14 days. This occluding or thrombotic barrier, as he terms it, contributes to the patient's comfort and is less incapacitating, he believes, by confining the thrombophlebitis and periphlebitic process to the thigh. He describes a method for locating the internal saphenous vein in the fossa ovalis (saphenous opening) which is indicated in *Figs. 37-39*.

REFERENCES.—¹Selections from *Army med. Dep. Bull.* 1941, 1942, 21; ²*Brit. Med. J.* 1942, 2, 453; ³*Ibid.* 1943, 1, 753; ⁴*Ann. Surg.* 1942, 116, 271.

VENEREAL DISEASES. (*See also* CHANCROID; GONORRHOEA; LYMPHOPATHIA VENEREA; SYPHILIS.) *T. Arnott-Davies, M.D., F.R.C.P.*

N. F. Rowstrom¹ thinks that Regulation 33B is a great disappointment, and that what promised to be an opportunity to deal with the problem of venereal diseases in a comprehensive way has resulted merely in the rounding up of a prostitute here and there. Occasionally a couple of soldiers may be found who are willing to testify to infection from the same source—a man loses his individuality in the army—but it is most exceptional to find two civilians who are able or willing to do so. The author believes that in civil life the Regulation will prove useless. He considers *that a doctor who undertakes the treatment of venereal disease in an official capacity should have the power to report the case to the Medical Officer of Health only if the patient refuses to continue treatment while still infectious.*

Prophylaxis.—Encouraging results with sulphathiazole as a prophylactic against gonorrhoea have prompted J. A. Loveless and W. Denton² (U.S. Army) to publish a preliminary report. Sulphathiazole was administered to approximately 1400 negro troops. Soldiers in the test group were given 2 g. before leaving barracks. Others received 4 additional grammes, 2 g. on returning to barracks and 2 g. next morning. Cost of this prophylaxis was negligible. Excluding the 'failures' not under the influence of the drug at time of exposure, the gonorrhoea rate dropped to a level of 8 per 1000 yearly, as compared with 171 per 1000 in the control group, and the chancroid rate dropped to 6 as compared with 52. The authors believe that prophylactic sulphathiazole would produce a remarkable decline in gonorrhoea and chancroid in the armed forces.

R. D. Arthur and H. Dermon³ support this view: 583 negro soldiers, known exposures to contacts, almost certain to be infected with venereal disease, were studied. Sulphathiazole prophylaxis was instituted the morning after exposure and consisted of 3 g. immediately after breakfast, 2 g. after dinner, and 1 g. after supper. The drug was administered to 152 men, 40 of whom received it one or more times after subsequent contacts. As, even if capable of preventing or aborting the clinical signs of gonorrhoea, sulphathiazole might not prevent the development of an asymptomatic carrier state, prostatic cultures were made after a reasonable period of time. In the control group, out of 384 exposures of 259 men who had not taken sulphathiazole, 42 acquired infections. In the experimental group, of 199 exposures in 152 men, 6 acquired infections. The rate of infection per 1000 exposures for those not taking sulphathiazole after contact was 109, and 30 for those who had the drug.

The suppression of facilitation by the Board of Health in the Greater Vancouver Area during 1938-41 has been shown by D. H. Williams⁴ to be more beneficial in lessening venereal disease than a direct attack on prostitution. The facilitation process comprises those community conditions associated with the participation usually for monetary gain, of third persons, whereby infected

individuals are made accessible for exposure to healthy persons. The facilitation centres are chiefly disorderly houses, certain beer parlours, hotels, dance halls, taxicab companies, apartments, massage parlours, tourist camps, road-houses, and restaurants. The facilitators are pimps and procurers with whom are closely associated finance and estate companies, and those engaged in the commerce of liquor. The male gonorrhoeal annual attack rate per 100,000 population dropped from 341 to 247, a reduction of 28 per cent. The annual admissions of acute syphilis fell 46 per cent, from 100 in 1938 to 54 in 1941.

REFERENCES.—¹*Brit. med. J.* 1943, 1, 21; ²*J. Amer. med. Ass.* 1943, 121, 827; ³*Amer. J. Syph.* 1943, 27, 261; ⁴*Ven. Dis. Inform.* 1943, 24, 249.

VISUAL STRAIN: ANISEIKONIA. *Sir Stewart Duke-Elder, M.D., F.R.C.S.*

This is a subject on which a considerable amount of work has been done in America but which has attracted little attention in this country. A recent paper by H. M. Burian¹ calls attention to the number of patients who are unable to attain visual comfort in the ordinary way, but who are relieved by its correction.

Aniseikonia is a condition wherein the size and shape of the retinal images appreciated by the two eyes are unequal. It seems evident that, in addition to the questions of refraction and muscle balance, the relative size and shape of the ocular images must also be considered in determining whether or not the eyes of any patient are functioning properly, and evidence is accumulating that although he is emmetropic and orthophoric for all distances of vision, this factor forms a possible basis for symptoms which hitherto may have been considered as neurotic in origin.

The inequality of the images may depend on two distinct factors: it may be an optical phenomenon depending on a difference in the size of the dioptric images formed on the retinae, or it may be anatomically determined by a difference in distribution of the retinal elements. With regard to the first factor, the difference between the dioptric images may depend on a difference between the refraction of the two eyes, and it is therefore present in some degree in most cases of anisometropia. The size of the image is governed essentially by the distance of the second nodal point from the retina, and consequently a further degree of aniseikonia may be determined by differences in the magnification effectivity of the correcting lenses worn, and is varied by the power, shape, and the position at which they are worn. Especially if the anisometropia is astigmatic, therefore, the correction of the refractive error may increase the aniseikonia. With regard to the second factor, it is quite obvious that even if the dioptric images of exactly the same size were formed on the retina, they would be appreciated as such only if the distribution of rods and cones was identical; if, for example, the visual elements were more widely separated in one eye than the other, the image received by the brain would appear to be smaller in the first since fewer end-organs were stimulated. Presumably it is this which accounts for the occurrence of aniseikonia in cases wherein the dioptric mechanisms cannot account for the phenomenon.

Slight changes in the size and shape of the ocular images are of constant occurrence and are responsible for stereoscopic interpretation, but these are of a very small order. A sensible degree of aniseikonia, however, occurs in from 20 to 30 per cent of people who wear glasses. The usual differences which occur in binocular single vision do not exceed 5 per cent; most commonly these occur in anisometropia. In cases of squint, however, differences of from 5 to 15 per cent have been found, in which case the aniseikonia has an important bearing on the treatment and prognosis of the condition. But the greatest degree is seen in corrected uni-ocular aphakia, wherein a difference of as much as 30 per cent may exist, when, as is well known, the optical condition is intolerable.

The relative sizes of the retinal images are measured by an instrument called the ophthalmo-eikonometer. Various modifications are still being introduced into this instrument, but it is essentially a form of reflecting stereoscope. The stereoscopic patterns do not quite fit and they differ in such a way that the discrepancies are readily assessed.

Symptoms.—The symptoms caused by this inequality of retinal images, like the symptoms caused by refractive errors, are many and various. They include visual disturbances, such as blurred vision, difficulty of fixation, a tendency to diplopia, and probably even a tendency to the development of squint. Photophobia and general ocular discomfort are also complained of, as well as headaches and the general nervous manifestations associated with eye-strain. The symptoms are frequently aggravated by reading, the cinema, and especially by moving objects when travelling.

The treatment of aniseikonia is to incorporate a suitable magnifying correction in the spectacles of the eye with the smaller image. These lenses are so designed that the refractive power of the surface toward the object is offset by the refractive power of the surface of the lens toward the eye, so that the image of the object is situated at the location of the object itself. In other words, when such lenses are placed before an eye they do not cause it to become apparently hyperopic or myopic. They can be ground as over-all size lenses, having the same magnification in all meridians, or as meridional size lenses, having a specified magnification in one meridian but no magnification in the meridian at right angles to it.

Burian finds that aniseikonia is as universal as errors of refraction or the heterophorias; and he considers that a size difference of 1 per cent is significant. He concludes that an ever increasing number of patients who are unable to obtain comfort by any other means are relieved of distressing symptoms by the wearing of isekonic corrections.

REFERENCE.—¹*Arch. Ophthalm.* 1943, 29, 116.

VITAMINS AND DISORDERS OF THE SKIN.

R. M. B. MacKenna, M.A., M.D., F.R.C.P.

There are few subjects in the field of dermatology which provide such scope for controversy as the association of vitamins and disorders of the skin. The matter will be discussed but briefly here, and the reader may consult the references given if further information is required.

G. Bamber¹ emphasizes that avitaminosis may occur from two causes: firstly, the omission of vitamins from the diet; and, secondly, the presence of some gastro-intestinal disorder that prevents or retards the absorption and utilization of the vitamins present in food; there is also the possibility that the body, through some inborn error of metabolism, may be unable to assimilate certain types of vitamins contained in foodstuffs.

P. A. O'Leary² summarizes our present knowledge concerning the utility of vitamin therapy. He states that in certain diseases of the skin, after the administration of a vitamin or vitamins either by proper diet or by the exhibition of synthetic forms of the necessary compound, the cutaneous signs of the disease disappear so rapidly that the deduction is warranted that the result is 'specific'. These diseases include pellagra, some forms of cheilosis, prurynoderma, pityriasis rubra pilaris, keratosis follicularis, and the so-called seborrhœids described by P. Gross.³ O'Leary emphasizes that under certain conditions vitamins, to be effective, must be in harmony or in combination; for example, in cases of pellagra, the simultaneous use of nicotinic acid, thiamine, and riboflavin is necessary to control the disease. He suggests that some other diseases, such as psoriasis, which, up to the present, have shown varying

degrees of improvement from vitamin therapy, may be completely controlled when the proper combination of vitamins is found.

H. Jeghers⁴ describes the characteristic skin change called phrynoderma, in which the specific cutaneous lesions characteristic of vitamin A deficiency are seen. The early sign is simply dryness of the skin; later, keratinized epithelium accumulates in the pilo-sebaceous follicular orifices and results in the formation of hyperkeratotic papules characteristic of the disorder. The term phrynoderma means "toad skin", and Jeghers suggests that the dermatological terms keratosis pilaris, lichen pilaris, lichen spinulosum, ichthyosis follicularis, etc., are only descriptive terms for "toad skin"; these conditions usually respond rapidly to the administration of vitamin A.

Jeghers quotes evidence compiled from many sources to support the belief that keratosis follicularis (Darier's disease) is a disorder attributable to an abnormal metabolism of vitamin A, but emphasizes that after therapy with this vitamin has been continued for some months the skin, although improved, is seldom entirely normal; therefore he suggests that there may be other factors in the pathogenesis of the disease. The daily dosage of vitamin A employed by various authorities in the treatment of Darier's disease has varied from 25,000 to 320,000 U.S.P. units administered orally for periods extending from 1 to 12 months.

A. Adler⁵ employed various preparations of vitamin A in attempts to cure light sensitivity; eventually he prepared a highly refined preparation of natural vitamin A esters in butyl or ethyl phthalate by which he claims that solar dermatitis in adults may be relieved. This, or a similar product, has been named L.C. 227 by British Drug Houses, Limited.

Bamber states that in patients with hypochlorhydria there is a rise in the total and free HCl of the gastric secretion when vitamin A is given. This vitamin may therefore be useful in the treatment of some cases of rosacea particularly if administered concurrently with riboflavin (*see below*).

Vitamin B has, in recent years, been split into several factors, not all of which are necessary for the health of man. The average daily requirement of vitamin B₁ (also known as aneurine or thiamine) is 1 to 2 mg. (300 to 600 I.U.), and lack of this gives rise to beri-beri and polyneuritis with secondary changes in the skin in areas where nerves have degenerated. Bamber states that the administration of aneurine has been reported as having led to improvement in acute leprous neuritis. It has been given for post-herpetic neuralgia.

Vitamin B₂ or riboflavin is found especially in yeast, liver and other organs, meat, fish, milk, cheese, eggs, peanuts, and pulses. Deficiency of this vitamin (ariboflavinosis) is associated with a clinical picture which includes maceration and fissuring at the angles of the mouth (resembling and possibly identical with perleche) and various changes in the lips called cheilosis. A typical glossitis characterized by a peculiar magenta colour, fissuring of the surface, enlargement and flattening of the papillae also occurs. Jeghers emphasizes that there are many other cases of changes in the lips beside vitamin deficiency (e.g., sensitivity to lipstick or toothpaste, sunburn, etc.). Ariboflavinosis may also be associated with a fine, scaly, greasy desquamation on a mildly erythematous base, situated in the naso-labial folds, on the alae nasi, on the bridge of the nose, and on the ears.

Also characteristic of ariboflavinosis is capillary invasion of the cornea, sometimes proceeding to superficial ulceration. The keratitis which sometimes complicates rosacea has been attributed to ariboflavinosis, but the administration of vitamin B₂ has given inconclusive results; nevertheless it is probably wise to prescribe riboflavin for persons suffering from this condition.

Nicotinic acid is the pellagra-preventive factor of the B series ; in the therapy of pellagra it should be exhibited with riboflavin and aneurine, and even then the anticipated results may be achieved but slowly as some pellagrins do not utilize vitamins easily.

P. Gross has attributed certain seborrhœic types of eruption to deficiency of vitamin B complex. By ' vitamin B complex ' is usually meant all the factors of vitamin B except the heat-labile aneurine ; but in American literature ' vitamin B complex ' may refer to all the factors except aneurine, riboflavin, and nicotinic acid.

A. Rudy and R. Hoffmann⁶ suggest that the skin eruptions which complicate diabetes mellitus are frequently of the pellagrous type, and that, on careful observation, signs of a deficiency of one or more components of the vitamin B complex, either before, during, or after the discovery of the skin disease, can be revealed. They state that at times there are also manifestations of deficiencies of other vitamins. They claim that improvement results from the treatment of intertrigo, vulvitis, pruritus vulvæ, and pruritus ani in diabetics, by the administration of nicotinic acid or nicotinamide with, and at times without, the addition of other vitamins of the B series.

Vitamin C (ascorbic acid) is frequently administered to syphilitics, as it is believed to prevent arsphenamine dermatitis. Vitamin C is, of course, necessary to prevent scurvy. Jeghers quotes C. S. Davidson who in a personal communication informed him that he had kept two scorbutic patients on a vitamin-C-free diet under controlled conditions. Therapy with crude vitamin P had no effect on the peri-follicular hæmorrhages and ecchymoses which had developed on the legs of these individuals. The ecchymoses disappeared only under therapy with vitamin C. Lack of vitamin C, therefore, is associated with follicular hæmorrhages and ecchymoses.

Sydenstricker and his colleagues⁷ have shown that by the administration of a diet free from biotin (which is probably identical with vitamin H) and rich in egg-white, pallor of the skin may develop preceded by a fine scaly dermatitis which disappears spontaneously and may be associated with atrophy of the lingual papillæ.

Vitamin K is said to be a precursor for the formation of pro-thrombin and necessary for normal hæmostasis. Not very much is yet known about vitamin K deficiency. This form of avitaminosis usually develops as a result of disease, and particularly liver disease, obstructive jaundice, and sprue. Jeghers suggests that the cases may be divided into two groups—those in which spontaneous bleeding occurs and those in which bleeding occurs only after injury. Petechiæ do not develop, the dermal lesions being ecchymoses, hæmatomata, or suffusions of blood.

Vitamin P is the vitamin of permeability. Some investigators still deny the existence of this substance, for it is found in nature—e.g., in hips and lemons—always in the presence of ascorbic acid. Vitamin P deficiency is characterized by petechiæ of orthostatic distribution which may arise spontaneously or appear over pressure areas ; the lesions may be peri-follicular.

No changes of the skin have yet been attributed to the lack of vitamin D, but G. Bamber refers to the attempts which have been made to use this vitamin for therapeutic purposes in the treatment of psoriasis, pemphigus, acne vulgaris, and occupational dermatitis.

Some of the most recent research concerning vitamins has been concerned with the harmony or antithesis which may exist between these substances and certain hormones in the body. Thus E. Shute⁸ states that vitamin E is an anti-œstrogen, and claims that severe vulvar pruritus or burning, and cases of senile vulvo-vaginitis or kraurosis vulvæ, respond very satisfactorily to the

administration of this vitamin; Jeghers suggests that the phenomenon known as palmar erythema may be due to the action of oestrogens interfering with the normal metabolism of some factor of the vitamin B complex. Further research on these lines will probably yield interesting results.

REFERENCES.—¹*Brit. J. Derm.* 1942, **54**, 163; ²*Arch. Derm. Syph.* 1942, **46**, 628; ³*Ibid.* 1941, **43**, 504; ⁴*New Engl. J. Med.* 1943, **228**, 678, 714; ⁵*Proc. R. Soc. Med.* 1943, **36**, 284; ⁶*New Engl. J. Med.* 1942, **227**, 893; ⁷*J. Amer. med. Ass.* 1942, **118**, 1199; ⁸*J. Obstet. Gynec.* 1942, **49**, 482.

VITAMINS AND NUTRITION.

A. E. Barnes, M.B., F.R.C.P.

Vitamin A.—There is still no satisfactory method of ascertaining the position of any one individual as regards vitamin A. The direct determination of the serum content of the vitamin as reported by H. W. Scalongne¹ seems to be capable of varying interpretations. He concludes that 6 or 7 International Units per c.c. serum is satisfactory, but his figures are derived from very few cases and are not impressive. Sadie Brenner and Lydia Roberts² report the experimental withdrawal of the vitamin from a group of young adults in a careful experiment extending over 20 to 31 weeks. The volunteers were examined for "dark adaption" by the 'biophotometer', 'adaptometer', and 'regonometer' methods; the blood for both vitamin A and carotene: the skin both macroscopically and microscopically. The only difference found as the experiment progressed was that the carotene content of the blood diminished. There were no symptoms. One interesting fact is that one of the controls had a naturally very low blood-content of vitamin A and it was found impossible to raise it by the daily consumption of 10,000 units. At the end of the experiment it was found still possible to demonstrate a rise in the vitamin content of the blood after a dose of alcohol. This means that there was still a store of vitamin A in the liver. It seems, therefore, that the demonstration of deficient dark-adaptation in a group of tuberculous and diabetic patients by B. A. Dormer and M. Gibson³ cannot be directly translated into terms of vitamin A deficiency.

J. H. Kodicek and John Judkin,⁴ using the slit-lamp in the examination of the conjunctivæ of school children at Cambridge, found some sub-epithelial changes which may possibly be due to avitaminosis A, but they carefully refrain from making such a claim. They found no relation between these changes and the results of the dark adaptation test.

Vitamin B₁ (aneurine or thiamine, 'safe' daily intake 3.20 mg.⁵).—Deficiency of this vitamin is encountered in this country only in the conditioned deficiencies caused by alcoholism and gastro-enteritis. F. J. Browne⁶ in a controlled test has shown that the daily administration of 3 mg. to pregnant women does not tend to diminish the toxæmia of pregnancy. The fact that aneurine deficiency may adversely influence mental moods⁷ is regarded by R. Goodhart⁸ as possibly of importance in industrial medicine. He points out how a large percentage of the aneurine content of a meal can be lost through cooking in canteen meals or avoided by judicious purchase. He states that industrial surveys in America have shown that 19 per cent of the workers have lost vibratory sense in the toes when tested with a C 256 tuning fork.

Vitamin B₂ (riboflavin, 'safe' daily intake 3.7 mg.).—This vitamin is of clinical importance in this country. Cases of ariboflavinosis undoubtedly exist in the general population, but they are not serious and it is doubtful whether they have been increased by the war. The final court of appeal, rightly or wrongly, has been the demonstration of a special form of corneal vascularization by means of the slit-lamp microscope. The slit-lamp is expensive and hard to come by and its revelations may not be too easy of interpretation. These are discussed in a critical paper by M. K. Gregory⁹; Kodicek and Judkin⁴ also describe their

observations in children by this method and confirm the presence of aribo-flavinosis in the older children. The subjective eye symptoms (photophobia and lacrimation) have been conspicuous by their absence in the cases seen by the reviewer, who, however, practises in a city which at present must be a paradise for the photophobic. The description of the tongue by Harold Jehgers¹⁰ is helpful. It is "magenta or purplish red. The epithelium over the papillæ does not desquamate but appears flattened and oedematous with resultant mushroom-shaped papillæ that give the tongue a finely pebbled or granular appearance." It may be incidentally remarked that the slit-lamp gives a beautiful view of these papillæ. This "pebbly" tongue, with or without the cheilosis and changes in the labionasal furrow, should serve to pick out at least the seriously deficient.

There has been little of importance published about the other members of the B complex, but perhaps it is worth recording that I. Kerlan and R. H. Herwick¹¹ have shown that 20 mg. per diem for six months of calcium pantothenate has no effect on grey hair.

Vitamin C (ascorbic acid).—This is of great importance, as the results reported below indicate that we are actually or in danger of slipping below the safe minimum of 30 mg. per diem. L. J. Harris and M. Olliver¹², in some studies of institutional feeding at a well-conducted home for waifs and strays, show that the antiscorbutic activity of the diet is almost entirely dependent on the green vegetables and potatoes. They prove that the cooking water from the vegetables contains about half as much ascorbic acid as the cooked vegetables themselves. It should therefore be used for gravies, etc. Prompt serving and punctuality at meals are also important factors because "keeping hot" for 15 minutes destroys 25 per cent of the vitamin, whilst waiting for half an hour destroys 40 per cent. From January to June the daily dose was under 30 mg., reaching a minimum in March and April of 19 mg. The necessary intake of vitamin cannot be attained under institutional conditions without a plentiful intake of potatoes. Their actual assays of the vitamin showed that assessment by means of published food tables is reasonably accurate. J. R. Marrock and colleagues¹³ had previously published a similar survey of the feeding in British Restaurants and school canteens under the Hertfordshire County Council and showed that vitamin C ration in the meals was insufficient when it was taken into consideration that to its partakers this meal was probably the sole supply of vitamin C for the day. Surgeon-Commander C. C. Ungley¹⁴ in the case of a mine sweeper found for two successive weeks the rations supplied to the crew averaged only 16 and 22 mg. per day respectively, but that no signs of scurvy could be detected in the crew. The problem has also been approached by means of the saturation test as estimated by the number of daily doses it takes to saturate the body so that the excess is excreted in the urine. R. E. Flowerdew and O. B. Bode¹⁵ applied the test to an internment camp. They got poor results in the winter but better in the summer. Those internees who supplemented the rations by eating raw vegetables gave good results; better even than those of the officials of the camp. A definite improvement resulted from better cooking and serving. Leslie J. Harris¹⁶ tested the pupils who fed at the school previously mentioned. He emphasizes that the test does not start from the assumption that a state of saturation is necessary or even desirable but that it shows how near the individual is to becoming scorbutic, in which state it requires 7 to 10 days to saturate him instead of one or two. The boys in the school were all saturated within three days. Geraldine Z. L. McNee and J. Reid¹⁷ studied a number of naval ratings and Glasgow civilians and found that many in both classes were far from saturation yet appeared in good health. They also observed nine cases of definite scurvy, but all these cases had been grossly negligent of their diet. Probationer

nurses at a large London hospital were tested by Helen P. Wright,¹⁸ who found that some of them were near deficiency. A technical article by D. Richter and P. G. Croft¹⁹ discusses difficulties of the test. One is of importance to everybody engaged in these surveys: that aspirin can give rise to erroneous results. From all this it appears that the spring of 1944 may be a test of the national diet.

Are Vitamin Additions to the Diet of Adults Necessary or Useful?—This is a question which every thoughtful man asks himself, and usually fails to find a clear answer. It can only be answered by carefully controlled experiments statistically treated. There are two such inquiries before us. A. A. Harper, I. F. S. MacKay, H. S. Raper, and G. L. Camm²⁰ gave a group of 69 cadets on a full ordinary diet an addition of 6000 I.U. of vitamin A, 1000 I.U. of vitamin D, and 50 mg. of ascorbic acid per diem. They found a significant diminution in the number of minor gastric and respiratory upsets, with increased vital capacity, breath-holding, and endurance times in R.A.F. tests. They made the experiment more telling by then reversing the two groups and showing that withholding the vitamins was followed by a reversal. G. N. Jenkins and J. Yudkin²¹ tried a similar experiment on a group of children with negative result. The experiments were not quite comparable, as the cadets were older and were presumably under much greater strain both mental and physical. Is it not possible that some sort of relative deficiency may be at the root of that real but elusive problem known as "outgrowing one's strength"? It certainly seems to be the case with rickets that rapid growth demands more vitamin.

DEFICIENCY DISEASES

By far the most important candidate for entrance into the list of deficiency diseases is *cirrhosis of the liver*. Recent experimental work by Paul György and H. Goldblatt indicated that a focal or diffuse necrosis of the liver sometimes associated with a diffuse periportal fibrosis may be produced in the rat by reducing the protein and at the same time withdrawing all the B complex. It has not yet been settled which of the B group is actually concerned. The two workers mentioned were credited with the discovery in an editorial,²² but have since pointed out that several other workers had independently arrived at similar results. They gave a list of the relevant papers.²³ Choline definitely protects from this deficiency injury, whilst cystine intensifies it. The adverse effects of fat on an injured liver have been known for a long time. C. H. Greene²⁴ has discussed the effects of these discoveries on the dietetic treatment of portal cirrhosis. The modern tendency is to relate the injurious effects of alcohol not to a specific poisonous action of the alcohol but to an avitaminosis due to either impaired absorption from intestinal irritation or to a diminished intake of vitamin owing to 'natural' composite foods being replaced by a pure fuel. If there be any serious degree of truth in this interpretation, especially if the evidence tends towards the second alternative, then there is a very serious indictment of the use of a pure carbohydrate such as sugar or glucose.

NUTRITION AND THE WAR

There is still no evidence that the nutrition of the people is seriously affected by restrictions except the rather doubtful fall in stores of vitamin C, which may conceivably be connected with the rise in tuberculosis.

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med. J. 1943, 2, 171; ¹⁸*Lancet*, 1943, 1, 802; ¹⁹*Lancet*, 1943, 1, 802; ²⁰*Brit. med. J.* 1943, 1, 24; ²¹*Ibid.* 2, 265; ²²*J. Amer. med. Ass.* 1942, 120, 625; ²³*Proc. Soc. exp. Biol.* 1941, 46, 492; *J. clin. Invest.* 1941, 20, 440; *Science*, 1941, 93, 598; *Publ. Hlth. Rep.* 1941, 56, 1255; and *Proc. Soc. exp. Biol.* 1941, 48, 228; ²⁴*J. Amer. med. Ass.* 1943, 121, 715.

VOMITING AND NAUSEA, EPIDEMIC. (*See EPIDEMIC NAUSEA AND VOMITING.*)**WAR PSYCHIATRY.***Aubrey Lewis, M.D., F.R.C.P.*

There has been a copious output of articles, most of them confirming, with further observations, various principles and procedures already widely known but not always widely applied. Much interest has been shown (especially in the United States) in methods of ensuring that unsuitable men, likely to break down, are not accepted for service; too often hitherto this has been a matter of shutting the stable door after the horse is out. The need for careful selection was expressed in this country at a symposium to which Lord Horder, D. Curran, J. R. Rees, R. D. Gillespie, and others¹ contributed, though they were not entirely agreed on the standards of exclusion. It was also abundantly urged, along with many interesting clinical and psychopathological contributions, in a symposium on military psychiatry held by the American Psychiatric Association.²

In order to determine the criteria of unsuitability, a useful comparison was made by E. G. Billings, F. G. Ebaugh, et al.³ between 100 soldiers with psychiatric illness and 100 soldiers apparently free from such disorder who therefore constituted a control group. The psychiatric cases were selected so that one-third of them had some psychotic illness, one-third either mental deficiency or a constitutional psychopathic disorder. A very careful examination was made by a team consisting of psychiatrist, psychologist, psychiatric social worker, and general physician. Among the controls were some men in whom there was greater likelihood of indirect psychiatric disorder than in an average population. The conclusions reached tally with those of other investigators but deserve attention because of the thoroughness with which the data were collected. The signs which chiefly differentiated the group of patients from the controls and which had been present before entry into the army were: hypochondriasis; signs of autonomic instability, especially generalized sweating; irregular employment; under-activity; disturbed sexual development; difficulty in making friends; morbid fears; and lack of definite ambition; voluntary enlistment had also to be included here, for extraneous reasons. It appeared that if any four or more of these signs had been used originally to determine suitability for military service, 95 per cent of the patients would have been rejected, but only 20 per cent of the controls. On further investigation of the 20 control cases who would have been thus excluded, only 3 of them were considered to be well-adjusted. Among the relatively well-adjusted soldiers of the control group, minor symptoms were found with the following frequency: depressive trends, 17 men; obsessional traits, 13; apparent intellectual dullness, 13; chronic homesickness, 12; feelings of inferiority, 12; minor hypochondriacal complaints, 10; negativism, 7. These symptoms were counterbalanced by healthy attitudes and did not usually cause undue distress. Both groups investigated were made up of men with less than one year's service; consequently they had not been subjected to some important military stresses. Billings and his associates consider that the men with psychopathic personality whom they examined prove the futility of setting up labour battalions, since such men continue to create difficulties regardless of the type of discipline to which they are subjected or the number of times they are returned to active duty. The authors suggest however that 'limited duty' officers, who have in many cases similar problems to the men, might be able to command special units made up of such psychopaths. The family history of the patients was conspicuously less satisfactory than that of the controls, but it cannot safely be assumed that the controls would give as full an account of mental illness and troubles in their family as would the patients who are seeking the doctor's help. [The evidence given in the paper seems

insufficient to warrant the conclusions drawn about labour battalions and about the best way of dealing with psychopathic personality. There is evidence partly to the contrary from larger experience elsewhere.—A. J. L.]

L. G. Rowntree, K. H. McGill, and O. H. Folk⁴ analysed the results of physical examination in 20,000 men examined as to their suitability for military service in the United States between November, 1940, and May, 1941. Rowntree, McGill, and T. I. Edwards⁵ have now made a similar study of boys aged 18 and 19 who were examined and found unsuitable or to have physical and mental defects. There were wide differences between whites and negroes. The two commonest causes of rejection amongst whites were visual and mental diseases, accounting respectively for 47 and 27 registrants rejected per thousand examined; for negroes the corresponding figures were visual defect, 17; mental diseases, 32. Mental diseases included not only grave mental disorders but psychopathic personality and neuroses. They did not include mental deficiency (which was responsible for 6.8 rejections per thousand examined in whites, and 10 per thousand in negroes), nor neurological conditions, including epilepsy, post-encephalitic syndrome, and post-concussional syndrome. Educational deficiency, which was listed separately, accounted for 11 rejections per thousand among the whites, and 121 per thousand among the negroes. The next most common cause of rejection, after mental diseases, among the white youths was musculo-skeletal conditions, accounting for 22 per thousand, and cardiovascular accounting for 19 per thousand; it is noteworthy that 'tachycardia', included under cardiovascular disorders, was responsible for 1.2 rejections per thousand white men examined.

Macdonald Critchley⁶ indicates one of the rarer pitfalls in selecting for military service. He describes three men, one with congenital word blindness, another with syphilitic changes in the brain, and a third with arteriopathic alexia, who had a disability in reading or executing morse signals. Critchley examines the requirements for morse telegraphy and flashlight signalling, and the respects in which "signal speech" differs from ordinary spoken speech.

A brief survey of the methods of classifying personnel in the British Army on the basis of psychological and psychiatric examination is given by D. M. Kelley.⁷ He quotes, as examples of the job analysis that has been carried out, the tabulated duties and requirements for a tank driver and for an orderly-room clerk in the infantry.

A concise survey of 1300 cases of anxiety state seen in a Royal Naval Hospital between 1940 and 1941 has been made by G. V. Stephenson and K. Cameron.⁸ In only a small proportion of the cases was hospital treatment required for more than 2 to 5 weeks; the individuals with average endowment and stability showed remarkable capacity for recovery from the illness and were able to return to duty at sea.

W. Sargent⁹ has reviewed the various forms of physical treatment which are beneficial in acute war neuroses, and stressed their preventive effect, when promptly applied.

E. L. Cooper and A. J. Sinclair¹⁰ conducted a clinic for neurotic soldiers in Tobruk and were able to follow the records of the patients subsequently. Of 207 patients, 132 suffered predominantly from anxiety states, and 34 showed simple conversion hysteria. The remainder were classified as having hypochondriasis, psychopathic personality, mental defect, and, in six instances, malingering; there were also four cases of schizophrenia, and one of melancholia. In the anxiety states prompt treatment favoured a good prognosis; the older men did worse than the younger ones. Hysteria occurred almost entirely in young men. Three-quarters of those with conversion hysteria returned to duty satisfactorily.

I. C. Michaelson¹¹ has found that half the soldiers presenting themselves as out-patients in the eye department of a hospital in the Middle East had complaints of a "neurotic" nature. The symptoms most often complained of were defective day vision; poor night vision; asthenopia; diplopia; spots before the eyes; and epiphora. They were due to either hysteria or chronic anxiety state. In some instances "organic" symptoms developed later; thus a number of patients with the syndrome of headache, epiphora, and photophobia later had exophthalmos, though without thyroid enlargement or increased pulse-rate.

V. P. Mahoney and W. O. Linhart¹² report 13 cases of hysterical amblyopia, in all but one of whom uncorrected visual defect was found, as well as concentrically contracted fields and characteristic disturbances of personality. It is remarkable that all but three of the patients had an intelligence quotient of 80 or less; ten of them had to be discharged from the Army.

C. P. Symonds in his Croonian lectures¹³ and other papers has cast much light on the psychological factors determining the response to flying stress. Since Birley's¹⁴ Goulstonian lectures in 1920 there has been no comprehensive survey such as Symonds has now provided; although statistics have necessarily to be omitted from his exposition, it rests on access to an unrivalled body of data, and cannot be briefly summarized.

Several papers deal with psychiatric problems among *merchant seamen*, a very important group exposed to severe hazards. S. Margolin, L. S. Kubie, M. Kanzer, and L. Stone¹⁵ report their observations on 40 seamen who had presented themselves voluntarily for examination while in port. The men could not be regarded as a sample of all merchant seamen, but the relationship of neurotic reactions to wartime catastrophies at sea could be assessed in them. It was found that a quarter of them had severe persisting reactions, and that these were more severe in men who had been heavily alcoholic or who had a history of past psychiatric illness. Severe disturbances occurred mainly among Europeans, and least often among Latin Americans and negroes; the numbers, however, were small. Severe reactions were particularly high among seamen from tankers. There was surprisingly little connection between the severity of the reaction and the position of the seaman in his ship when attacked. The writers conclude that a persisting neurotic reaction should be considered inevitable in at least 75 per cent of the seamen of the Merchant Marine who have been subjected to torpedoing and bombing. Consequently they advocate rest camps at which all seamen should have an opportunity to convalesce emotionally from the effects of any such experience. If possible, seamen with symptoms due to bombing, etc., should be treated before they are allowed to return to their own homes and to their usual haunts. If after a period of rest and convalescence they have recovered from previously severe symptoms they should have a graded return to sea duty, e.g., first of all on inland or shore waters. Alcoholics and men with a history of previous mental disorder should be prevented from going to sea. Any disputes about pay, bonuses, compensation, etc., should be settled promptly. Adequate drill and explanation should be employed to raise the morale of these men. [The recommendations, sound enough in themselves, go beyond what is practicable under existing conditions; the authors' estimate of the probability that all men exposed to torpedoing and bombing will develop a persisting neurotic reaction is also dubious. As they themselves point out, the sample they studied is small and probably unrepresentative.—A. J. L.]

A review of 249 cases carried out by Daniel Blain,¹⁶ the Medical Director of War Shipping Administration, U.S.A., indicates that the traumatic experience has not usually precipitated neurosis unless the seamen also had personal problems to disturb them apart from the disaster. W. A. Bellamy¹⁷ has during the last

15 months interviewed more than 1200 merchant seamen survivors, and studied their psychological reactions to being torpedoed. At five rest centres (also described by H. W. Potter¹⁸) there have been 435 completed cases, in 203 of which the diagnosis was traumatic neurosis. The majority were discharged "no further convalescence needed", but three times as many neurotic men had to be discharged for disciplinary reasons as men with medical or surgical disabilities.

REFERENCES.—¹*Proc. R. Soc. Med.* 1943, **36**, 253; ²*Amer. J. Psychiat.* 1943, **100**, 1; ³*War Med.* 1943, **4**, 283; ⁴*J. Amer. med. Ass.* 1942, **118**, 1223; ⁵*Ibid.* 1943, **123**, 181; ⁶*J. Mt. Sinai*

med. J. 1943, **2**, 703; ⁷*40*, and *Lancet*, 1940, **2**, 100; ⁸*Lancet*, 1940, **2**, 22
3, 393; ¹⁰*Amer. J. Psychiat.* 1943, **100**, 131; ¹⁷*Ibid.* 114; ¹⁸*Ibid.* 120.

WAR SURGERY. (See also WAR WOUNDS, GENERAL.)

Lambert Rogers, M.Sc., F.R.C.S.

In recent numbers of the MEDICAL ANNUAL (1942, p. 345; 1943, p. 386) comment has been made, under this heading, on the manner in which surgical practice has been directly modified by war experiences. As might be expected, the chief subjects dealt with have been wounds and their complications, foreign

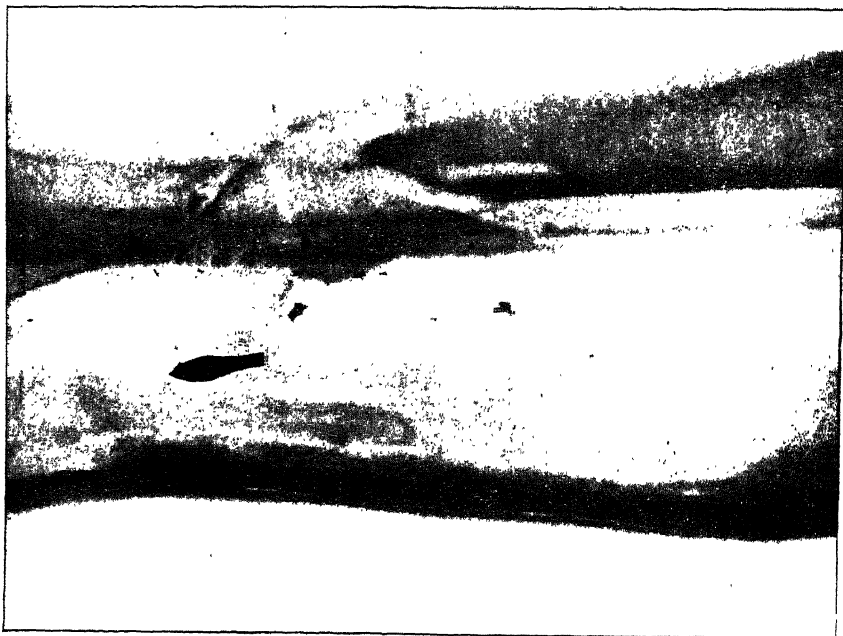
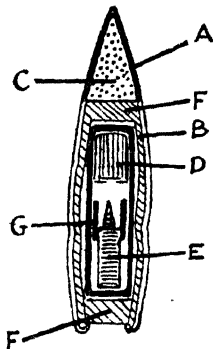


Fig. 40.—Radiograph showing comminuted fracture of tibia and fibula, armour-piercing nose-cap of phosphorus incendiary bullet, and scattered fragments of lead lining. (By kind permission of the 'Journal of the Royal Army Medical Corps'.)

bodies and their behaviour and detection, the care of the wounded, and allied questions. There are few branches of surgery which have not been influenced in some way by the war, and reference to these will be found under their appropriate headings throughout the war-time numbers of the MEDICAL ANNUAL. In addition, however, the past year has produced some papers which are best noticed under this heading of war surgery.

Wounds by Incendiary, Tracer, and Explosive Bullets.—Bullets of this character have been fired from German aircraft. Major J. R. Cameron¹ records 3 cases of wounding by these missiles, fired from a Junkers 88; in one case the armour-piercing nose-cap of a phosphorus incendiary bullet produced a compound fracture of both bones of the leg (*Fig. 40*). The wound "smoked", and despite prolonged irrigation continued to "emit puffs of smoke in the manner of a cigarette smoker each time its lips were opened". He notes the friability of incendiary and tracer bullets and their tendency therefore to produce more severe wounding. A. J. Blaxland² has recorded fatal phosphorus poisoning from the contents of a 0-312 Mauser incendiary bullet (*Fig. 41*) which penetrated the left thigh and entered the abdomen. The wound emitted a visible vapour and the smell characteristic of phosphorus. The patient, a Canadian airman, aged 24,

Fig. 41.—The 0-312 Mauser pattern incendiary bullet (description by Lieut. K. M. Wheeler, R.E.) The total weight of the bullet is about 10·6 g. The outer case is in two layers, except the nose—the outer layer of hardened iron with copper plating (A), the inner layer of lead (B); the whole of which encloses, in the nose of the bullet, a concentration of phosphorus (C); and in the main body a brass sleeve containing a detonator (D), of high explosive, actuated by a striker (E). F, F are lead plugs, and G is a safety device. The total quantity of phosphorus is the equivalent of 3·254 gr., most of which is in the nose, although some seems to have crept up between the inner and outer skins of the casing. (*By kind permission of the 'British Medical Journal'.*)



died with anuria and uræmia six days after being wounded, and at the autopsy the liver was dull yellow in colour and on section showed extensive necrosis with fatty degeneration, while the kidneys showed catarrhal changes. The pathologist reported that the gross destructive lesion of the liver was typical of acute phosphorus poisoning. Investigation of the type of bullet from an identical batch found on a wrecked German aircraft showed it to contain $3\frac{1}{4}$ gr. of phosphorus, which is twice the minimum fatal dose. In the case noted it was suggested that the bullet entered the thigh, where it exploded, probably on striking the iliac bone, and thereby released and scattered the phosphorus contents.

Treatment of Phosphorus Burns.—The Chief Medical Officer for Scotland³ has issued a memorandum on the first-aid treatment of these burns in which he reminds us that the affected part should be immersed in water and any particles of phosphorus embedded in the skin removed under water by means of gauze held in forceps. Washing with dilute alkalis, e.g., sodium bicarbonate, should be followed by washing with a 1 per cent solution of copper sulphate. The resulting dark deposit of copper phosphide is then removed with a swab soaked in warm water. No oil or greasy dressings should be used.

The Smashed-in Face.—This injury, which may result from any severe external force of a blunt as opposed to a penetrating character and be the consequence therefore of such a commonplace accident as falling downstairs, has also occurred on the various battlefields, in cities and elsewhere from air-raid casualties, and through crashes of aircraft. D. H. Patey and E. W. Riches⁴ point out that before a patient with such an injury can be transferred to a special facio-maxillary unit the condition may call for emergency surgical procedures which present special problems of their own. As a first-aid measure it is essential to turn the patient on to his side so that blood can run away from the respiratory passages. Emergency procedures include the cleansing of the parts, arrest of hæmorrhage, and approximation of the soft tissues and fractured bones, but the difficulty of

anæsthesia arises in a patient whose respiration may be already seriously embarrassed by blood running into the pharynx. Asphyxial symptoms have been found to develop after intravenous pentothal, and the difficulties of inhalation anæsthesia on a mask, or of introducing tubes, are obvious. These writers therefore suggest that the standard initial emergency treatment of patients with the severer types of smashed-in face should be tracheotomy or laryngotomy performed under local analgesia. "When an opening into the air-passages has been made", they write, "the anæsthetic problem becomes easy, the danger of death from asphyxia is averted, the reduction in cyanosis from the establishment of a free airway may by itself result in cessation of much of the hæmorrhage, and the surgeon can if necessary proceed to further measures for the local control of hæmorrhage, the approximation of the soft tissues, and the correction of gross bony displacement."

Amputations.—These become of paramount importance and interest during war time, and finality does not yet appear to have been reached regarding certain questions relating to them.

Two-Stage Amputation.—Where amputation of a shattered limb has been delayed longer than 12 to 24 hours, infection of the stump is almost inevitable



Fig. 42.—Guillotine disarticulation through knee-joint prior to two-stage amputation.

from organisms which have invaded the wound and migrated up the lymphatics of the limb. In delayed cases it has been customary to perform either a low guillotine section or a flap amputation, the flaps being left widely open until sepsis has subsided. E. A. Jack and J. Charnley⁵ found from experience of these methods during the Second and Third Libyan Battles that they entailed prolonged morbidity and were unsatisfactory. They therefore suggested a two-stage procedure. The first stage begins as a standard type of flap amputation at the appropriate level. "Often the vessels are seen to be surrounded by œdematous connective tissue, signifying lymphatic infection extending up the limb." When hæmostasis is complete, sulphanilamide powder is dusted into the wound and a dry gauze pack introduced and carefully inserted well up into the folds of the flaps; the ends of the gauze pack are left projecting from the corners of the incision, while the flaps are pulled together over it with four or five sutures and a well-padded dressing is applied. The second stage follows four or five days later, when the flaps are opened, the gauze pack removed, a second liberal coating of sulphanilamide powder applied, and the flaps closely

sutured without drainage. The sutures are left in place for fourteen days. (Figs. 42-44.)

If during the interval between the stages there are signs of pronounced infection the flaps are opened. At the time of their report these writers had treated 26 cases by this two-stage method; only two needed to have the flaps left open after the first stage, mild infection supervened in some, but 18 obtained healing by primary union. While the guillotine amputation seeks to sidetrack infection



Fig. 43.—Appearance of stump before opening at second stage.



Fig. 44.—Stump before removal of sutures fourteen days later. (Figs. 42-44 by kind permission of the 'British Medical Journal'.)

and the loose-closure method to minimize its effects, this two-stage operation aims at and frequently succeeds in preventing infection. [The enclosed gauze pack as a method of internal drainage was effectively applied by the late Sir William Wheeler some years ago in cases of psoas abscess, and more recently in other types of infection, and this principle would appear to be worthy of wider application.—L. C. R.]

REFERENCES.—¹J. R. Army med. Cps. 1942, 79, 269; ²Brit. med. J. 1942, 2, 664; ³Addendum to D.H.S. Memorandum, 169/1941, 1942, July 24; ⁴Brit. med. J. 1943, 2, 161; ⁵Ibid. 132.

WAR SURGERY IN HOSTILE COUNTRIES.

Lambert Rogers, M.Sc., F.R.C.S.

Through the *Bulletin of War Medicine*¹ reports of papers published in enemy countries have become available here. Certain innovations in German surgical practice are worthy of notice, as are also some of the experiences reported by surgeons in enemy territory.

Transportation of Wounded.—From the Russian front air transport has been used effectively for conveying German wounded to hospital. This has proved a great boon; cases of gas gangrene have been few and no case of tetanus has been reported (H. Angerer²). M. Ernst³ writes that immobilization of wounds and rest are most important in the healing process. Transportation of any kind interferes with healing to some extent, and should only be permitted if much more favourable conditions can be obtained for those transported. If transportation can be avoided the injured man usually has a better chance of recovery.

Wounds.—Writing on wound treatment, H. Bartholomé⁴ states that the finger is the best exploring instrument. Foreign bodies and completely separated fragments of bone should be removed. If incisions in the thigh are required these are best placed laterally rather than on either the extensor or flexor surfaces. When rigors complicate an infected wound and indicate a metastasizing and generalized infection, the main vein of the limb should be ligatured high up, away from the wound. Good results have followed this practice applied to the femoral (8 times), the external iliac (4 times), the brachial (7 times), and the popliteal (once).

When ligation of a main artery produced extreme pallor indicative of impending necrosis, it was found that the rapid introduction of 800–1200 c.c. of blood saved the limb. It is suggested that this is due to the increased blood volume causing a rise in arterial pressure with an opening up of the collateral circulation.

Wounds did well in plaster of Paris with large windows which exposed them to the sun's rays, while bronchitis kettles were used to prevent over-drying.

The sulphonamides locally in frankly septic wounds did not appear to have any advantage over other forms of treatment.

Foreign Bodies.—Kirschner⁵ states that it is not possible to give a categorical answer to the question whether a buried missile should be removed, as the decision is dependent on several factors. In many cases multiple small fragments are best left alone, but careful search for, and removal of, a retained missile is justified if serious complications are likely to arise, e.g., if a relatively large missile is located in a large joint, in the cranium, or the spinal canal. The finding of small foreign bodies is notoriously difficult. A valuable aid in the detection of a small missile is the injection of a staining fluid (such as methylene blue) through a hollow needle introduced down to the foreign body under X rays. The surgeon can then trace the missile by way of the coloured tissues. Powerful electromagnets, except in the case of the brain, have proved disappointing in dislodging magnetic fragments, as the force exerted is insufficient. Moreover, many missiles and splinters are non-magnetic. Tetanus antitoxin should always be given when a missile is removed.

Delayed Hæmorrhage.—Analysing 35 cases of delayed hæmorrhage from a series of between 300 and 400 wounded, W. Rückert⁶ found sepsis to be of little account and that the cases could be divided into two groups. Group I consisted of 26 patients with false aneurysms consequent upon injury of main vessels. Hæmorrhage occurred within 3 or 4 weeks, most often between the 10th and 15th days. Two patients died before operation; 19 of 24 operated upon recovered. Operation consisted of excision of the false aneurysm after securing the main vessel on either side of it. Group II consisted of the remaining 9 cases.

In these hæmorrhage occurred most often in the 5th week, and was due to erosion of a vessel by bone or bomb fragments or by drainage tubes.

Traumatic Aneurysm.—E. Rehn⁷ reports the treatment of 5 cases of traumatic aneurysm of the subclavian artery, the result of gunshot wounds, by resection followed by a venous transplant, either from the contiguous subclavian vein (1 case) or from the femoral or great saphenous veins (5 cases). In each case the aneurysm was exposed by dividing the clavicle and displacing the outer half of the bone laterally. Good results are reported. [It is doubtful whether this transplantation is either necessary or desirable, however. Contrary to what occurs in the lower limb, the subclavian artery can usually be divided with impunity. The reviewer has resected a subclavian aneurysm in a man in the fifties without the patient suffering any disability beyond a temporary pallor of the limb, and it is highly likely that the transplanted vein may become a source of trouble later.—L. C. R.]

Causalgia.—Writing on the treatment of gunshot wounds of peripheral nerves, Tönnis and Götze⁸ point out that aneurysms may produce causalgia. Two cases of brachial causalgia were found to be due to axillary aneurysm, another was relieved following discovery of an aneurysm of the carotid and subclavian arteries and ligation of both vessels. In still another case, severe sciatic pain was found to be due to an aneurysm of the superior gluteal artery and was relieved by ligation of the internal iliac artery. [This origin of pain referred to the periphery of a limb should not be overlooked.—L. C. R.]

Joint Wounds.—Penetrating wounds of joints still constitute a problem of war surgery. Writing on the treatment of chronic joint infection with uncontrolled suppuration, C. Franz⁹ states that during the war of 1914 to 1918 both British and German surgeons were in agreement in advising amputation in such cases when it became evident that simple drainage had failed. American, French, and Austrian surgeons, on the other hand, were inclined to favour resection and some good results were reported. Franz makes out a case for resection in certain cases and believes it should not be too long delayed. For suppuration in the knee or hip he believes the operation should be performed 8 to 14 days after thorough arthrotomy if there has been no subsidence of the inflammatory process in the meantime. Longer delay may be practised in the case of the shoulder, elbow, ankle, or wrist. For septic infection of the hip this author recommends immediate resection of the femoral head, believing that it is not possible to drain the hip-joint adequately by anterior and posterior incisions alone.

Franz regards resection as preferable to amputation because ankylosis in good position may be obtained and in some cases even a good range of movement. Amputation should be reserved for fulminating cases and those in which resection, to be adequate, would require to be so extensive as completely to preclude usefulness of the limb.

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WAR SURGERY, MECHANICAL SKELETAL FIXATION IN. (See MECHANICAL SKELETAL FIXATION IN WAR SURGERY.)

WAR WOUNDS: GENERAL.

Lambert Rogers, M.Sc., F.R.C.S.

At this stage of the war it is perhaps permissible to comment on the better results which, generally speaking, have so far followed the treatment of the wounds of this war when compared with the last. Many factors have been operative in bringing this about: early excision, the use of the sulphonamides

and more recently penicillin, tetanus toxoid prophylaxis, early plaster fixation, specially trained mobile surgical teams, and, for the most part, healthier environment than the tetanus-ridden mud of Flanders. It must not be forgotten, however, that there is another important factor in the character of the wounds themselves. This depends upon the nature of the missile and the velocity imparted to it. For the most part the wounds of the present war have been caused by small fragments which are comparatively light, intensely hot, and travelling at high velocities of a magnitude which has never before been attained. In consequence such fragments tend to penetrate cleanly the body coverings, uniform, equipment, etc., which they may strike, and once they have done so to change their momentum rapidly and come to rest in a comparatively short distance. Compare this with the leaden musket ball which mortally wounded Nelson. Entering over the left shoulder and traversing the spinal canal in the mid-thoracic region, it came to rest in the muscles of the back on the opposite side of the body. When removed there was found firmly attached to the ball, "a portion of the gold lace and pad of the epaulette, together with a small piece of his lordship's coat" (*Life of Nelson*, Richard Clarke, London, 1813). In the last war it was common to find pieces of uniform, webbing or leather equipment, etc., in wounds, and although such has occasionally been the case in this war, wounds for the most part would appear to have been less contaminated in this way, especially those produced by bomb and shell fragments. The writer has seen numerous cases of small pieces of bomb or shell fragments in the brain, in which it has been hard to detect the entering wounds in the scalp so small and clean have they been, and it has been altogether exceptional for hair, pieces of scalp or calvarium to be in-driven with such fragments, the great majority of which have remained surgically clean and produced no evidence of infection. This factor of the changing character of wounds must be given due consideration when taking into account results of treatment and making comparison of this with that carried out in other wars in which different weapons and missiles were used.

Penicillin and War Wounds.—The discovery of this substance dates from an observation made towards the end of 1928 by Professor Fleming of St. Mary's Hospital, London. He noticed that the accidental contamination by the mould, *Penicillium notatum*, of a culture plate of staphylococci had produced lysis and disappearance of the staphylococcal colonies adjacent to the mould. In the subsequent applications of this fact to clinical practice Professor Florey and his co-workers at Oxford have played a large part. Penicillin, the active product of the mould, has now been given a widespread trial in the practice of both civilian and war surgery.

It can be used either as the calcium or sodium salt. For local applications the calcium salt is satisfactory and has given good results when applied directly to wounds, especially those of the soft tissues. For general administration the sodium salt is used. It is given intravenously and should not be given by mouth as it is destroyed by the acid of the gastric juice. Among the organisms which have been found to be most sensitive to it are streptococci, staphylococci, and clostridia. A Committee on Medical Research¹ in America has reported on the use of the drug in 300 patients, some of whom were soldiers with unhealed compound fractures, or osteomyelitis, or wounds with long-established infection. Their conclusions are as follows: There is good reason for the belief that it (penicillin) is far superior to any of the sulphonamides in the treatment of *Staphylococcus aureus* infections with and without bacteraemia, including acute and chronic osteomyelitis, cellulitis, empyema, infected wounds, and burns. It is also extremely effective in the treatment of hæmolytic streptococcus, pneumococcus, and gonococcus infections which are resistant to sulphonamides. It has

not been found effective in the treatment of subacute bacterial endocarditis. Studies of the results of its local application are still inadequate.

Properly made preparations have given no toxic reactions even from the largest dosage. Its rapid excretion in the urine necessitates frequent administration when given intravenously or intramuscularly.

Penicillin is most useful, at present, in the treatment of overwhelming infection, especially that due to *Staphylococcus aureus*, *Streptococcus pyogenes*, or pneumococcus. Experimentally it has shown a marked action against *Actinomyces bovis* and the organisms of gas gangrene. It is not very effective against Gram-negative bacteria or the tubercle bacillus, or any strain of *Streptococcus viridans* other than *Streptococcus salivarius*.

Penicillin has the advantage of not being affected to any appreciable degree by pus or products of tissue autolysis, and of being influenced only to a minor extent by the number of bacteria present. It is therefore active under conditions which annul the bactericidal power that sulphonamides normally possess. Further, penicillin is not affected by the development of resistance towards sulphonamides, and may prove valuable in preventing the spread of these drug-resistant strains through the community.

During the past year penicillin was taken to the Mediterranean theatre of war and reports of the results of its application have recently come to hand.^{2, 3} It was necessary to ascertain the best and most economic methods of use to prevent sepsis under battle conditions. It has been found that in addition to the now well-known beneficial effects of early instillation in wounds, infection in compound fractures under fourteen days old can be brought under control. In adequate dosages it is effective against gas gangrene, but will not counteract the toxæmia, and all dead muscle therefore should be excised and anti-gas-gangrene serum given in large doses. Bacteriological examination of material aspirated from brain wounds showed in the majority of cases examined that, with penicillin, Gram-positive cocci disappeared from the wound within forty-eight hours. Penicillin has also been used with success in infected burns and surface wounds, also in such hitherto troublesome cases as osteomyelitis of the frontal bone.⁴

The production of penicillin is at present very limited owing to the small yield from considerable quantities of culture fluid, the susceptibility of the cultures to contamination, the liability to destruction of the penicillin itself, and difficulties in extracting, purifying, and stabilizing it. Its molecule is complex and unstable, and attempts at synthesis have not so far been successful.

It offers great promise for the future, and surgeons everywhere are awaiting supplies of this remarkable substance. Meanwhile in order to conserve the available supplies and use them as far as possible to the best advantage, these are being kept in various centres for the use of teams who are keeping careful records of the types of case, the infecting organisms, and the results obtained.

REFERENCES.—¹ Penicillin: Statement Released by the Committee on Medical Research, *J. Amer. med. Ass.* 1943, **122**, 235; ² War Office Memorandum, *A.M.D.* 7; ³ *Bull. War Med.*, H.M. Stationery Office, 1944, **2**, 1; ⁴ *Proc. Mayo Clin.* 1943, Dec. 1.

WARTS.

R. M. B. MacKenna, M.A., M.D., F.R.C.P.

A. Burrows¹ has voiced the general belief that wart cases are becoming increasingly common. Certainly, large numbers of young adults with large and unsightly accumulations of sessile warts on their hands have been seen during 1942 and 1943. Warts, which are said to occur not only in human beings, but also in cattle, dogs, and rabbits, are contagious and auto-inoculable. R. H. Rulison² states that the average incubation period after experimental inoculation is four months. Warts are caused by a virus which is epitheliotropic, i.e.,

it invades only cells of epithelial origin. It is not known whether separate but closely related viruses cause the different types of warts that occur in man, or whether a single virus is the causal agent in all forms of warts, but there is a growing tendency to believe that a single virus may be responsible. Some years ago it was demonstrated by Waelsch³ that wart virus obtaining from so-called venereal warts injected into the skin resulted in the growth of sessile verrucae.

R. H. Rulison states that there are five varieties of warts which occur in man : *verruca vulgaris*, *verruca plantaris*, *verruca plana juvenilis*, *verruca filiformis*, and *verruca acuminata*. He omits *seborrhœic* and *senile keratoses* from this list as they are not due to virus infection, and he does not mention the tuberculous wart (*verruca necrogenica*). These clinical differentiations are due, in the main, to the site of the lesion and the nature of the supporting tissues. The essential pathology is the same, namely, under the stimulus of a common agent, the filterable virus, the prickle cells of the epidermis undergo active division, resulting in a localized hypertrophy ; the horny layer is also thickened. Warts, therefore, have been defined as localized circumscribed hypertrophies of the prickle-cell layer of the skin.⁴

In a statistical study of 872 cases, Rulison found that in New York warts were slightly more common in females than in males, the ratio being 57.2 to 42.8. In a series of 921 patients he found that the highest incidence of all except filiform and acuminate (venereal) warts was between the ages of 5 and 25, the age of greatest incidence being apparently between 15 and 20 years. An analysis of his cases suggested that some families have a relatively higher resistance to infection with wart virus than others.

It is well known that warts undergo spontaneous retrogression, but no satisfactory explanation has been given for this phenomenon. Possibly, the recovery is due to the death of the virus when the cells it attacks are unsatisfactory hosts, or to the virus rapidly causing the death of the infected cells.

TREATMENT.—In spite of the infective nature of the condition and the demonstration of immunity reactions, no form of general therapy has met with uniform success. Treatment is essentially local and involves the complete removal of the tumour. This may be a simple procedure with a filiform wart and with an isolated common wart which can be anaesthetized and scraped, but the removal of multiple sessile warts often taxes the ingenuity of the clinician.

Rulison believes that recurrences, which unfortunately are not infrequent after removal, are noticed on an average about three months after an apparent cure, but may take place at a much later time. He emphasizes that claims that a given method of treatment results in a certain percentage of cures should be made only after the patients have been followed for at least six months.

In discussing therapy, Burrows mentions the use of local keratolytics, including glacial acetic and salicylic acids, and dismisses this method as being tedious, success depending largely on the intelligent co-operation of the patient. For small warts he considers the cautery to be an excellent, if slightly painful, treatment. Electrocoagulation is also satisfactory. On cosmetic grounds, he prefers the use of the cautery, as its action is less deep and the resulting scar, if any, is better. He advises that treatment with the cautery should be superficial and repeated if necessary, and should never take the form of a single deep attack. Carbon-dioxide snow is superficial in its action, and therefore has one particular use, namely, in the treatment of warts round the margin of the nails, where deeper treatment, particularly radiological, is likely to interfere with the growth of the nails. Treatment with CO₂ snow usually has to be repeated a number of times. When a leisurely and relatively painless attack can be made on warts, a combination of the use of CO₂ snow and electrocoagulation or desiccation

may be excellent. Curettage is usually preferable to wide excision. The technique recommended by Burrows is to make an incision with a scalpel round the wart, just through the epidermis, and then to insert a largish strong curette under the cut margin and lift the wart out. The base is then cauterized with the electric cautery, or with phenol, to destroy any part of the wart that remains and to stop bleeding.

There are four radiological methods which may be used : superficial X rays, Grenz rays, the Chaoul technique, or radium. The dosage of X rays has not been standardized ; Burrows recommends an unscreened dose of 1 to 2 B, using a kilovoltage of 80-100. He believes that if the wart is sensitive it disappears quickly ; but, if not, it is not worth while taking the risk of using bigger doses, and it is better to proceed to other methods. Others would recommend a slightly higher kilovoltage of, e.g., 110 and an initial dose of 600-700 r which may have to be repeated in 4-6 weeks. When using superficial X rays it is advisable to protect the surrounding skin with lead rubber. C. Ryan⁵ states that while it is well known that warts yield to X rays, a study of the literature indicates that there is always a variable percentage that do not involute. He claims that with Grenz rays no such resistance is met. Dosage varies from 1000 to 4000 r. Burrows and Ryan both state that the dose may have to be repeated, sometimes more than once. With the Chaoul contact or close method of therapy the results are by no means certain : the dosage varies from 800 to 1500 r. Radium vies with curettage as being the best treatment for single warts, but this form of therapy is obviously expensive, time-consuming, and the particular concern of the specialist.

Theoretically, it should be possible to prevent warts, and if individuals could be segregated into communities in which no person was allowed to have untreated warts, these lesions might become rarities. In boarding schools, which are—to some degree—closed communities, the measures taken to prevent the spread of warts—and particularly of plantar warts—have often not been very successful. This failure may have been due to the fact that while sufferers from plantar warts have been denied the use of the swimming bath, sufficient attention has not been paid to pupils who had warts on their hands and who have been allowed to continue to disseminate their infection among the community. This statement may well be disputed, for it is not known whether the virus causing plantar warts is the same as that causing warts on other parts. School medical officers, or others interested in the prevention and treatment of plantar warts, would be well advised to read the recent annotation concerning this matter in the *Lancet*.⁶

REFERENCES.—¹*Brit. J. Derm.* 1943, **55**, 60 ; ²*Arch. Derm. Syph.* 1942, **46**, 66 ; ³*Recent Advances in Dermatology*, London, 1936, 385 ; ⁴*Army Med. Dep. Bull.*, Lond. 1943, para. 166 ; ⁵*Brit. J. Derm.* 1942, **54**, 47 ; ⁶*Lancet*, 1943, **1**, 653.

WEIL'S DISEASE. (See LEPTOSPIROSIS.)

WHOOPIING-COUGH. *H. Stanley Banks, M.A., M.D., F.R.C.P., D.P.H.*

Epidemiology.—There were 66,016 notifications of whooping-cough in England and Wales in 1942, compared with 173,331 in 1941, and 53,607 in 1940. The deaths in these three years were respectively 799, 2383, and 678.¹ The ratio of deaths to notifications shows little change in the course of these three years, and in this respect differs from that of measles.

Immunology and Prophylaxis.—Active studies are being pursued in various schools in the U.S.A. on toxin and antitoxin associated with *H. pertussis*. This subject at present is somewhat confused. Results from different sources cannot always be reconciled. M. Weichsal et al.² found a positive titre of antitoxin in

the serum of a certain percentage of children during active whooping-cough, but in many cases this was absent during convalescence. Injection of "detoxified pertussis antigen" raised the antitoxin titre in children with whooping-cough and in normal children, but large doses of bacterial vaccine did not produce this effect. J. G. M. Bullowa et al.³, on the other hand, injected 100 normal children with pertussis toxoid antigen and 35 normal children with pertussis vaccine and found that both these agents produced a rise in the antitoxin titre in 75 per cent of the cases, but in individual cases the response was unpredictable and sometimes delayed. They consider that the bacterial vaccine owes part of its antigenicity to its toxin content. These workers scored some success in passive immunization of contacts with *rabbit antitoxin* prepared in a similar way to antipneumococcus serums. Of 25 children injected with antitoxin while exposed grossly to infection, only one contracted the disease. In a subsequent test 1 c.c. of the antitoxin appeared to protect against exposure to infection for upward of three weeks, but not for six weeks.

Diagnosis.—Nasopharyngeal cultures were found by A. M. Brooks et al.⁴ to be somewhat superior to the cough-plate method in diagnosis. The swab used was similar to that used in diphtheria diagnosis, but the wire was 6½ in. long and was thin and flexible. It was passed through the nostril until it touched the posterior pharyngeal wall. In a series of 183 simultaneous cultures made by the two methods, 57 per cent were positive by the nasopharyngeal method and 34 per cent positive by the cough-plate method. Even better results were obtained in infants.

Treatment.—Detoxified Pertussis Antigen (Lederle) was investigated as a therapeutic agent by R. S. W. Baker⁵ in 20 cases, 17 being in the paroxysmal and 3 in the catarrhal stage. They were compared with a similar number of controls of equal age grouping and clinical severity. The criteria adopted were (1) duration of the disease, (2) complications (bronchopneumonia, convulsions, diarrhoea), and (3) lymphocytosis. In none of these respects was any material difference noted between the antigen-treated cases and the controls. [This confirms the findings of Bullowa et al.³ and of most other investigators that both toxoid and vaccines are ineffective for treatment in the paroxysmal stage of whooping-cough.—H. S. B.]

REFERENCES.—¹*Summary Rep. Min. Hlth.* 1943, 47, 48; ²*J. Amer. med. Ass.* 1942, 120, 396; ³*Ibid.* 886; ⁴*Ibid.* 883; ⁵*Brit. med. J.* 1943, 1, 562.

WOUND HEALING.

Lambert Rogers, M.Sc., F.R.C.S.

Effect of Vitamin C.—Although not perhaps as yet sufficiently realized, the evidence that adequate vitamin C is necessary for effective wound healing is now considerable. As supplies of the vitamin are not being obtained from natural sources as readily as before the war, the desirability of administering ascorbic acid in adequate amounts to patients in whom there is likely to be a deficiency will be evident. In 1923 B. Ishido¹ found considerable delay in the healing of experimental wounds of scorbutic guinea-pigs, and in 1937 T. W. Lanman and T. H. Ingalls² demonstrated that the tensile strength of healing wounds in these animals is lowered in the presence of scurvy. Other observers have confirmed these contentions. Recent papers have come from Boston, where M. K. Bartlett, C. M. Jones, and A. E. Ryan³ have estimated the ascorbic acid content of tissues and find that the tensile strength of wounds showing a high content is much greater than that of those with lowered values. In a further paper the same workers⁴ report that in spite of a low plasma ascorbic acid level at the time of operation, normal wound healing may be produced by adequate vitamin C therapy during the post-operative period. Geoffrey Bourne,⁵ reporting experimental work, states that vitamin C plays a fundamental part in the

regeneration of tissues, and for this reason its administration should be a routine part of the treatment of any injury. He suggests it may play an important part in the regeneration of bone by promoting the activity of fibroblasts and probably their differentiation into osteoblasts, by assisting in the formation of the collagen fibres of the bone matrix and by stimulating phosphatase activity.

Delay in Healing.—B. E. Brush and C. R. Lam⁶ report the result of experiments to ascertain the influence of healing exerted by certain substances when applied to wounds. Guinea-pigs were used. Chloramine paste in higher concentrations and urea delayed normal healing; the other substances, of which a number were tested, including vitamin and chlorophyll ointments, had no appreciable effect. It should be pointed out that these experiments concern the healing of primarily non-infected wounds in healthy animals.

[We may summarize by saying that it is desirable to administer adequate quantities of ascorbic acid, both to the wounded and injured and as a post-operative measure in surgical cases. There is no evidence that the local application of so-called stimulating ointments or vitamin-containing dressings has any effect, either in accelerating or retarding the healing of a wound. Certain substances such as urea delay healing.—L. C. R.]

REFERENCES.—¹*Virchows Arch.* 1923, 240, 241; ²*Ann. Surg.* 1937, 105, 616; ³*New Engl. J. Med.* 1942, 226, 469; ⁴*Ibid.* 474; ⁵*Lancet*, 1942, 2, 661; ⁶*Surgery*, 1942, 12, 355.

WOUNDS OF WAR. (*See WAR SURGERY; WAR WOUNDS.*)

YELLOW FEVER. *Sir Philip Manson-Bahr, C.M.G., D.S.O., M.D., F.R.C.P.*

Aetiology.—G. M. Findlay¹ has demonstrated that anoxæmia of the brain tissues tends to produce encephalitis in mice injected with the neurotropic yellow fever virus. The mice are starved for 24 hours, then given an intraperitoneal injection of insulin prior to that of the virus. A similar result takes place if the mice are treated with coal gas. The effect of insulin shock is to induce an oxygen deficiency and this in turn damages the blood-brain barrier and permits the virus to enter the central nervous system.

Transmission.—D. J. Lewis and his colleagues² have shown that additional species of *Aedes* in Central Africa may transmit yellow fever by their bites, such as *Aedes taylori* and *A. metallicus*; both species are abundant in the Nuba mountains of the Sudan where the epidemic of 1940 occurred, whilst in Western Uganda the virus has been isolated from wild-caught *Aedes simpsoni* by Mahaffy and his co-workers.³ In 1941 research workers of the Rockefeller Foundation found that certain species of *Hæmagogus* which are tree-top dwellers in the jungles of S. America harboured the virus.

Pathology and Clinical Manifestations.—E. Villela⁴ has published a detailed description of the histopathology of the liver and gives a very full account of mid-zone necrosis and of Councilman bodies. He describes bright ochre-coloured granules scattered through the lesions, and claims that they can be regarded as additional proof in the diagnosis of yellow fever. In this connection G. M. Findlay and his colleagues⁵ reported that during the Sudan epidemics subsidiary outbreaks of relapsing fever, associated with jaundice and infective hepatitis, had to be reckoned with, as in many respects they are so easily confused with yellow fever. Their differentiation entails the establishment of laboratories equipped for virus isolation, a viscerotomy service, and the mouse protection service.

In this connection the recently introduced biopsy method of studying pathological changes in the liver may prove of value. J. H. Dible and his colleagues⁶ have shown that with due precautions this method is reasonably safe. A small

cylinder of liver tissue is aspirated into a 2-mm. bore cannula passed transpleurally through an anesthetized track into the right lobe of the liver. This is then fixed in absolute alcohol, sectioned, and stained. In epidemic hepatitis, arsenotherapy jaundice, and serum jaundice the picture is one of hepatic cell necrosis, autolysis with leucocytic and histiocytic reaction, and infiltration. The centres of the lobules show the first of these changes most markedly, whilst the portal tracts show the greatest degree of cellular infiltration. It remains to be seen whether the typical structure of the yellow fever liver can be demonstrated by these means.

Control and Immunization.—A. Gaste Galvis⁷ has analysed 5000 specimens of liver collected in 117 viscerotomy posts in Colombia from 1934 to 1940. In 196 of these a definite diagnosis of yellow fever could be made. The service in this manner proved so efficient that not only did it become possible to prove the presence of yellow fever in hitherto unsuspected areas, but also to show its absence in other localities apparently favourable to its propagation. In addition this service proved useful in detecting fatal cases of subtertian malaria and in certain cases of massive liver necrosis, hitherto confused with yellow fever. The proven utility of this mode of inquiry would seem to render the establishment of a similar viscerotomy service in Central Africa a necessity in the near future. In the control of yellow fever the Rockefeller Foundation⁸ has pointed out that the most important measure is inoculation, but for urban outbreaks the control of *Aedes aegypti* is ever important.

Mouse Protection Test.—A paper by L. Whitman⁹ furnishes a valuable discussion of the variable factors involved in the development of a mouse protection test satisfactory for all purposes in the investigation of yellow fever problems. In 1931 Sawyer and Lloyd described an intraperitoneal protection test for yellow fever in *adult* white mice which has been of great value in determining the geographical distribution of yellow fever and has been important in the study of the disease in the field and laboratory. This test is based on the fact that, though adult mice are comparatively insusceptible to extraneural injection of yellow fever virus, they become uniformly so following cerebral trauma.

The test has several disadvantages: 3 c.c. of serum are required for one test; although of small importance when dealing with larger animals, it hinders studies on small animals and birds. Secondly, because of the large virus doses required per mouse, fresh unstandardized virus preparations must be used. Thirdly, starch injection into the brain increases mortality through manipulation and also augments time and labour. The intracerebral protection test described by Theiler relies on injection of serum-virus mixtures directly into the brain. The virus requirements are infinitesimal compared with the dosages needful for successful intraperitoneal tests, but the quantity of serum needed is likewise minimal. Desiccated virus suspensions of stability and known strength are required. The chief disadvantages are that some of the species of animals and birds possess toxic substances in their sera which are highly toxic for mice in intracerebral inoculation, but which do not affect them when injected intraperitoneally. Variations in technique of intracerebral injection, such as exact situation and depth, may result in discrepancies. An intraperitoneal test which could be performed at a single injection would have distinct advantages.

Theiler and Burgher have previously pointed out that baby mice were more susceptible to extraneural injection of yellow fever than were adults. In the first few days of life they are as susceptible to virus injected subcutaneously as adults injected intracerebrally. The author then tried the intermediate ages between 14 and 35 days to see whether there could be demonstrated an age at which intraperitoneal protection tests could be performed whilst omitting the supplementary starch injection into the brain and utilizing smaller doses of

serum and virus. New experiments indicated that up to 21 days of age young mice were susceptible to dosage of virus used, but beyond that age the percentage of mice killed by the virus fell rapidly. With two parts of immune serum added to one part of virus, the results of injecting 0.06 c.c. of the mixture into 18–21-day mice were found to be equivalent to injecting adult mice which have received intracerebral starch with 0.6 c.c. By increasing the proportion of immune serum to virus, and increasing the volume of the inoculation so that the amount of virus received by each mouse remained the same, the protection capacity of the immune serum is augmented. The presence of small amounts of antibody can thus be easily demonstrated. Only mice of uniform and exact age may be used.

REFERENCES.—¹*Trans. R. Soc. trop. Med. Hyg.* 1942, **36**, 21; ²*Ann. trop. Med. Parasit.* 1942, **36**, 34; ³*Rockefeller Foundation, Review for 1941* (Fosdick), 18; ⁴*Arch. Path.* 1941, **31**, 665; ⁵*Ann. trop. Med. Parasit.* 1941, **35**, 149; ⁶*Lancet*, 1943, **2**, 402; ⁷*Rev. de Hig. Bogota*, 1941, **4**; ⁸*Rockefeller Foundation, Review for 1940* (Fosdick), 27; ⁹*Amer. J. trop. Med.* 1943, **23**, 17.

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THE PRACTITIONERS' INDEX.

RECENT PHARMACEUTICAL AND DIETETIC PREPARATIONS, MEDICAL AND SURGICAL APPLIANCES, ETC.

In this Section we give short descriptions of the Pharmaceutical Products and the New Inventions of the past year. It should be understood that the information is supplied by the Makers. We invite all those concerned with the Medical Manufacturing Industries to co-operate with us in making this section valuable for present and permanent reference.

A short written description of each article is required, with the advantages claimed for it, and with the Maker's name and address appended. The Editors cannot accept reference to circulars or catalogues as a compliance with these conditions, and cannot undertake to compile descriptions from such material.

In the section on Drugs, their composition, principal applications, and dosage should be stated in the fewest possible words.

All particulars for this Section should reach us by November 30.

PROGRESS OF PHARMACY, DIETETICS, ETC.

Aceramine Red.—2:7-Diaminoacridine hydrochloride (powder), 1 and 25 g. Antiseptic. (Glaxo Laboratories Ltd., Greenford, Middlesex.)

Aceramine Yellow.—5-Aminoacridine hydrochloride (powder), 25 g. (Glaxo Laboratories Ltd., Greenford, Middlesex.)

Akrotherm.—A hormonal treatment indicated in conditions arising from disfunction of the capillaries, e.g., chilblains, cold extremities (hands, nose, ears, and feet) due to bad circulation. Clinical evidence has shown Akrotherm to be an effective preventive treatment for the above conditions. Composition: Extracts of various organs chemically related to histamine, acetylcholine, and adenosine 5 per cent, incorporated in an ointment base which allows rapid permeation of the substances into the skin and has a direct effect on the capillaries. Directions for use: Akrotherm should be massaged into the affected part several times daily and always after washing. (Priory Laboratories Ltd., 21, Eastbury Road, Northwood, Middlesex.)

Albucid Soluble.—The sodium salt of Albucid (sulphacetamide) is unique among sulphonamides in being highly water-soluble, producing solutions which are very nearly neutral. Hence concentrations of up to 30 per cent can be safely applied even to the eye without any local irritation. Half-ounce bottles of Albucid Soluble solution fitted with sponge or pipette applicators are available for eye work in strengths of 10 and 30 per cent, and published references to these are numerous. Striking results in industrial eye injuries were reported in the *British Journal of Ophthalmology*, December, 1942, and December, 1943. Tablets of Albucid Soluble for readily making a solution of 2½ per cent isotonic with the tear pH 7·4, as well as Albucid Soluble Eye Ointment in strengths of 2½ and 6 per cent are also issued, and Albucid Soluble Nasopharyngeal Solution 10 per cent with a surface tension of 37 dynes per cm. has been successfully used in nasal and paranasal infections; while special Albucid Soluble First-aid Dressing and Burn and Wound Dressing are issued in 1 oz. tubes for the treatment of burns, wounds, and skin conditions (impetigo, infected varicose ulcers, etc.). In dental practice a new preparation, Albucid Soluble Dental Cerate, issued in 1-oz. tubes, has been found to give most satisfactory results when packed into potentially septic sockets after difficult extractions or the removal of heavily infected roots. Gingival infections and cysts have also been treated with this preparation with considerable success.

The insoluble Albucid first introduced—and still largely used—for the oral treatment of gonorrhoea and urinary infections generally, particularly *B. coli* infections, is used in powder form sprinkled in the wound or cavity. Alternatively Albucid Soluble powder has thus been applied by some workers.

Packings:—

Albucid Soluble Eye Drops 10 per cent and 30 per cent in ½-oz. bottles.
Eye Lotion tablets in tubes of 12 and 50 and boxes of 250.
Eye Ointment in tubes of 60 gr. and 25 g. of 2½ per cent and tubes of 60 gr of 6 per cent.
Nasopharyngeal Solution in bottles of 1 oz. × 10 per cent.
First Aid Dressing in tubes of 1 oz. and jars 1 lb.
Burn and Wound Dressing in tubes of 1 oz. and 4 oz. and jars of 1 lb.
Sterile Powder in ampoules of 5, 10, and 15 g.
Dental Cerate in tubes of 1 oz. × 10 per cent.
"Albucid (insoluble) Peroral Tablets in tubes of 20 and bottles of 500 × 7½ gr.
Sterile Powder in ampoules of 5, 10, and 15 g.
(British "Schering" Ltd., 185-190, High Holborn, London, W.C.1.)

'Anæsthesin' Throat Tablets.—Each tablet contains 0.1 g. anæsthesin, 0.05 g. sodium borate, and 0.0025 g. menthol, combining the antiseptic sodium borate and soothing menthol with a local anæsthetic in the form of ethyl-p-amino-benzoate which rapidly paralyses the sensory nerve-endings, and may be used in a variety of painful conditions of the mouth and throat. It is non-irritating in the suggested dosage, and low solubility prevents absorption and remote toxic effects. Indicated pre- and post-operatively in tonsillectomy or oral surgery and painful affections of the tongue. Dosage: one tablet to be dissolved slowly in the mouth three or four times daily. (Bayer Products Ltd., Africa House, Kingsway, W.C.2.)

Anethaine (Infiltrative).—Amethocaine hydrochloride, 100-mg. dry ampoules. Infiltrative analgesic. (Glaxo Laboratories Ltd., Greenford, Middlesex.)

Anethaine (Spinal).—Amethocaine hydrochloride 10- and 20-mg. dry ampoules, and 20 mg. in 2 c.c. Spinal analgesic. (Glaxo Laboratories Ltd., Greenford, Middlesex.)

Anti-Typhoid-Paratyphoid A, B and C Vaccine (T.A.B.C.) (Alcohol-Treated) 'Wellcome'.—This vaccine contains in each c.c. 1000 million *Bact. typhosum* and 500 million each *Bact. paratyphosum*, A, B and C. It is prepared according to the technique of A. Felix (*Brit. med. J.* 1941, 1, 391), and contains a high proportion of the Vi antigen which has been shown to be essential for maximum immunizing efficiency. The suppliers emphasize the necessity of adhering strictly to the recommended scale of dosage. Issued in containers of 1 c.c., 5 c.c., and 10 c.c. (Burroughs Wellcome & Co. (The Wellcome Foundation Ltd.). Temporary War-time Address: 12, Red Lion Square, London, W.C.1.)

Anti-Typhoid-Paratyphoid (T.A.B.) Suspended Vaccine.—

<i>Bact. typhosum</i>	1000	} million per c.c.
<i>Bact. paratyphosum</i> A	500	
<i>Bact. paratyphosum</i> B	500	

(Glaxo Laboratories Ltd., Greenford, Middlesex.)

Argotone Nasal Drops.—Ephedrine hydrochloride (natural levorotatory) 0.9 per cent; argyrol (Barnes) 1 per cent; normal saline solution q.s. 100. Stabilized. Its principal use is for nasal and eye affections and their complications: common colds, chronic rhinitis, asthma, hay fever, sinusitis, otitis, chronic pharyngitis, catarrh, conjunctivitis. Dosage: With dropper: 4 to 6 drops in each nostril, 3 to 5 times daily. With a spray: At least 5 times daily in each nostril. (Rona Laboratories Ltd., London, N.W.2.)

Ascorbic Acid B.D.H.—The tablets and solutions in ampoules formerly listed under this name are now issued as 'Vitamin C B.D.H. (Ascorbic Acid)'. (The British Drug Houses Ltd., Graham Street, London, N.1.)

Auramit.—Ampoules containing sodium aurothiomalate with vitamin B₁. A graduated parenteral course of 10 ampoules for cases of bronchial asthma, rheumatoid arthritis, pulmonary tuberculosis, etc. Dosage: Intramuscular injections—1 per week, to be continued in numerical order. (Clinical Products Ltd., 2, The Green, Richmond, Surrey.)

'Beflavit' Vitamin B₂ (Lactoflavin, Riboflavin, Vitamin G).—In order to distinguish British-made vitamin B₂ the name 'Beflavit' has been registered to identify the vitamin B₂ preparation manufactured by Roche in this country. Production has increased considerably, and it has recently been found possible to introduce tablets and ampoules of greater concentration, namely, tablets of 3 mg. and 2 c.c. ampoules of 5 mg., for use in dermatological and ophthalmological practice and in tropical medicine. (Roche Products Ltd., Welwyn Garden City.)

'Benerva' B₁.—To meet the demand for a high-dosage product of vitamin B₁, 'Benerva' B₁ Ampoules have been introduced containing 100 mg. in ampoules of 2 c.c. The existing strengths of 5 mg. and 25 mg. are retained, the new strength being especially indicated in treatment of cases of gross vitamin B₁ deficiency. The extreme example of vitamin B₁ deficiency is seen in beri-beri, but large doses are occasionally indicated, e.g., in severe alcoholic neuritis. The new-strength ampoules are issued in boxes of 3's and 12's. (Roche Products Ltd., Welwyn Garden City.)

Benzeran Cream.—A cream containing 25 per cent benzyl benzoate in a vanishing cream type base. For the treatment of scabies. Issued in jars of 2 oz., 12 oz., and 46 oz. (Evans Sons Lescher and Webb, Liverpool and London.)

Bromoisovalerylurea (B.V.U.).—A safe sedative and mild hypnotic, capable of rapidly inducing sleep, the effect lasting for several hours. It is without toxicity and non-cumulative, and may be taken for protracted periods without risk of complications or habituation, no unpleasant side-reactions resulting from its administration. Of value in nervous disorders of all kinds, sleeplessness of varying degree, convulsions, dysmenorrhœa, travel sickness, etc. Dosage: As a day-time sedative, one or two tablets several times a day; as a hypnotic, up to three tablets at bedtime. Issued as 5-gr. tablets in 10's, 100's, and 1000's. (Genatosan Ltd., Loughborough.)

Cefonin Tablets.—Phenylsemicarbazide gr. 4; caffeine gr. $\frac{1}{2}$; lactose gr. 5. Principal use: For headaches, migraine, neuralgia, influenza, rheumatism, etc. Dosage: 1 to 3 tablets daily. (Manufacturers: Cefonin Ltd., London, W.C.2. Sole distributors for the United Kingdom: Hommels Hæmatogen & Drug Co., London, S.E.24.)

Chonex.—A preparation giving an optimal degree of the therapeutic activity of the bile-salts combined with complete freedom from toxic action. Chonex acts as a cholagogue and not merely as a cholagogue. Administration is followed promptly by an increase of bile secretion to the extent of 100 or 200 per cent. The main indication is in functional insufficiency of the liver.

It is of great value in jaundice due to interruption of the flow of bile caused by catarrhal swelling along the liver and bile-ducts. Non-surgical drainage of the biliary system is obtainable through the administration of Chonex. In surgery of the bile-tract it is useful pre-operatively to those patients in need of stimulation of biliary secretion, whilst after operation its use may obviate some of the unpleasant reactions associated with surgery of the biliary tract. In some cases of chronic constipation it is often possible to restore normal peristaltic action of the bowels by stimulating the secretion of the bile. The choleric action of Chonex is positive and efficient and it should not be employed in cases of total biliary obstruction or in empyema of the gall-bladder. Dosage will vary with the needs of the patient and the condition being treated. The average dose of Chonex Tablets for oral administration is one to two tablets two or three times a day after food for a period of four to six weeks. After an interval of one or two weeks the course may be repeated if necessary. Chonex Tablets containing 4 gr. of dehydrocholic acid are available in vials of 20 and bottles of 100 and 500 tablets. (Endocrines-Spicer Ltd., Watford, Herts.)

Citro-Thiocol.—This preparation, the manufacture of which was suspended owing to war-time difficulties, is once again available. Citro-Thiocol is an efficient, agreeable cough syrup containing the following ingredients : Thiocol gr. 24, codein. phosphatis gr. $\frac{1}{2}$, sod. cit. acid gr. 20, chloroform min. $\frac{3}{4}$, alcohol min. 7, ext. glycyrrh. glycerin (Roche) min. 124. Thiocol is a potassium salt of guaiacol-sulphonic acid. It is less toxic than either phenol, creosote, or guaiacol, and practically free from the gastric disturbances provoked by these drugs. It is indicated in all conditions in which cough is a prominent and distressing symptom, and can be administered with safety in catarrhal affections, coughs, whooping-cough, cough after measles, etc. Citro-Thiocol is issued in bottles of 4 fl. oz. only. (Roche Products Ltd., Welwyn Garden City.)

Collosol Auro-calcium (Crookes) (Syn. *Calcium Aurothiomalate*).—Collosol Auro-Calcium (Crookes) is a finely divided aqueous suspension of calcium aurothiomalate prepared for intramuscular injection. It contains 51 per cent of gold. It is valuable in the treatment of rheumatoid arthritis and has the advantage of being much less toxic than other gold compounds used in this disease. A course of 3 weekly injections of 0.5 ml. followed by 9 of 1 ml. is recommended. (The Crookes Laboratories, Gorst Road, Park Royal, London, N.W.10.)

Cupragen.—A non-greasy emulsified ointment-cream containing 0.2 per cent copper sulphate and 1 per cent zinc sulphate in a water-miscible base, intended for the treatment of impetigo, sores, facial blemishes, and minor dermatoses. It is mildly antiseptic and astringent and has also an emollient and healing effect on the skin. On impetiginous lesions, following crust removal, and on other weeping surfaces, Cupragen, being water-miscible, associates readily with the serous exudate and is retained in prolonged and intimate contact with the affected area; in this respect it is superior to the aqueous zinc and copper lotions formerly employed. Supplied in 2-oz. jars and bulk quantities of 1 lb., 5 lb., 14 lb., etc. (Genatosan Ltd., Loughborough.)

Deltamin Tablets.—Acetyl salicylic acid 7.70 gr.; ephedrine hydrochloride 0.30 gr.; excipient 1.20 gr. Principle use: Colds, hay fever, asthma, rhinitis. Dosage: 1 to 4 tablets daily or as directed by the physician. (Rona Laboratories Ltd., London, N.W.2.)

Deriphyllin.—Theophyllin-di-ethanolamine. An effective, well-tolerated diuretic, vasodilator, and cardiac stimulant. Packing: Drop bottles of 10 and 30 c.c.; boxes of 6 ampoules \times 1 c.c. and 25 ampoules \times 1 c.c.; boxes of 6 and 25 suppositories. (Camden Chemical Co. Ltd., Northington Street, London, W.C.1.)

Dicoumarin (Organon).—Tablets containing 50 mg. of 3, 3'-methylenebis (4-hydroxy-coumarin). This is a synthetic, orally active, hæmorrhagic agent. It is recommended for use in thromboses, emboli, and all those disorders requiring anticoagulant treatment for which heparin is used. The recommended dose is 200 mg. on the first two or three days. It should be noted that the anticoagulant action is not shown until 24-72 hours after the start of administration. The sodium salt is also supplied for intravenous injection. (Organon Laboratories Ltd., Brettenham House, Lancaster Place, London, W.C.2.)

Dienæstrol B.D.H.—Dienæstrol B.D.H. is the synthetic gynæcogen, 3:4-*p*:*p'*-dihydroxy-diphenyl-2:4-hexadiene, originally recommended for the inhibition of lactation and now issued for clinical trial in other conditions in which an æstrogen is indicated. Issued in tablets of 0.1 mg. in bottles of 25. (The British Drug Houses Ltd., Graham Street, London, N.1.)

Dienæstrol (Boots).—A new synthetic æstrogenic substance which is considerably more potent than stilbæstrol and has given good results in inhibition of lactation and in the treatment of menopausal disorders. Supplied in tablets of 0.1 mg. (Boots Pure Drug Co. Ltd., Nottingham.)

'Dolantal.'—Brand of pethidine hydrochloride (the carboxylic acid ethyl ester of 1-methyl-4-phenylpiperidine), originally introduced on the Continent and now available in this country, possesses three main properties—analgesic, antispasmodic, and sedative. The analgesic effect appears to be between that of morphine and codeine, while the antispasmodic action contributes to the rapid relief of pain of the 'colicky' type; the sedative action is definite but not marked. 'Dolantal' is indicated for the relief of spasm, particularly that associated with muscle spasm in the gastro-intestinal, biliary, and genito-urinary tracts. Thus, biliary, renal, and uterine colic, severe labour pains, rigidity and spasm of cervix and dysmenorrhœa are among suitable indications for its administration. Dosage: the average adult dose for most medical and surgical conditions is 100 mg. administered intramuscularly or subcutaneously, the initial dose being 50 mg. The oral dose is one or two tablets of 25 mg., one to three times daily, after meals. In order to avoid the dangers of possible habituation and cerebral irritation, amounts greater than 150 mg. every three hours should not be given. (Bayer Products Ltd., Africa House, Kingsway, W.C.2.)

'Franol'.—This preparation is composed of several antispasmodics known to have a marked relaxing action on the musculature of the bronchi: Luminal (phenobarbitone) 0.125 gr., 'Theocin' (theophylline) 2 gr., and ephedrine alkaloid 0.15 gr., and as such has been found to relieve bronchial spasm and to effect subjective relief during an acute attack of bronchial asthma of allergic origin. Dosage: the dose must be adjusted to meet individual requirements. In adults, the exhibition of one or two tablets when an attack threatens or during its prodromal stages, followed if necessary by one tablet half an hour later, often suffices to abort an attack or alleviate its severity. (Bayer Products Ltd., Africa House, Kingsway, W.C.2.)

'Genophyllin' Brand Theophylline-Ethylenediamine (Aminophylline).—A soluble compound of theophylline and ethylenediamine, exhibiting valuable properties as a coronary vasodilator, diuretic, myocardial and respiratory stimulant. Useful in cardiac oedema and cases of congestive heart failure, and recognized for its favourable influence on Cheyne-Stokes' respiration and bronchial asthma (especially where adrenaline fails). Aminophylline is of relatively low toxicity and has the advantage of being effective by the oral route as well as parenterally. Available in the form of tablets ($1\frac{1}{2}$ gr.), suppositories (0.36 g.), solution in ampoules for intravenous use (0.25 g. in 10 c.c.), and for intramuscular use (0.5 g. in 2 c.c.) (Genalosan Ltd., Loughborough.)

Gentian Violet Pills B.D.H..—Gentian violet is being used increasingly for the treatment of threadworm infestation. It is issued in a suitable form for this purpose as Gentian Violet Pills B.D.H. which have a special enteric coating which resists disintegration until the pill reaches the lower intestine. Pills containing $\frac{1}{4}$ gr., $\frac{1}{2}$ gr., and 1 gr. are issued, each in bottles of 60 pills. (The British Drug Houses Ltd., Graham Street, London, N.1.)

Gestyl.—Gonadotrophin from pregnant mares' serum is now available in two higher strengths—1000 and 3000 I.U. ampoules. The former strength is suggested as a daily intramuscular injection for the stimulation of the germinal epithelium of patients showing testicular inactivity. The 3000-unit strength, following some work published in America, is recommended for the treatment of primary and secondary amenorrhoeas and anovular cycles. The dosage recommended is 3000 units for five days at mid-cycle followed by three days' treatment with chorionic gonadotrophin. (Organon Laboratories Ltd., Brettenham House, Lancaster Place, London, W.C.2.)

Globin Insulin (with Zinc) 'Wellcome'.—A clear, aqueous solution containing 40 or 80 units of insulin in each c.c., with globin and a small percentage of zinc (see MEDICAL ANNUAL, 1942, p. 88). In rapidity of onset and duration of action it is intermediate between unmodified ('soluble') insulin and protamine zinc insulin; its effects are apparent about two hours after injection, reaching a maximum in about eight hours, gradually decreasing thereafter, and becoming almost completely exhausted 18 to 24 hours after administration. These characteristics give improved control in many cases of diabetes, enabling them to be satisfactorily maintained on a single daily injection. Both strengths are issued in bottles of 5 c.c. (Burroughs Wellcome & Co., (The Wellcome Foundation Ltd.)). Temporary War-time Address: 12, Red Lion Square, London, W.C.1.)

Glucose.—10 per cent aqueous solution of glucose for use with Anethaine (spinal) to produce hyperbaric solutions. (Glaxo Laboratories Ltd., Greenford, Middlesex.)

Hepamino.—Hepamino is a proteolysed liver preparation obtained by the controlled digestion of whole liver with papain.

Indications: Hepamino, because it contains substantially all the soluble, active principles in liver, can be reasonably expected to be suitable for many of those anæmias for which extracts of liver have hitherto been successful. It may also find application in those anæmias associated with nutritional asthenia requiring the therapeutic administration of amino-acids, polypeptides, etc. In these conditions the solubility and pre-digested state should prove to be a distinct advantage.

Dosage and administration: Experience gained so far suggests that the initial dosage of Hepamino should be one or two tablespoonfuls daily, reducing to one or two teaspoonfuls daily for maintenance therapy. For the present suggestions regarding dosage must of course be tentative and it is advisable to consider each case on its merits and work out the most suitable dosage by trial. If large doses are required they can be given with perfect safety. Hepamino can be given dissolved in warm water, milk, soup or other suitable liquid and seasoned to taste. The fluid containing Hepamino should not be boiled.

Hepamino is issued in screw-capped jars containing 5 oz. (approx.) (Evans Sons Lescher and Webb, Liverpool and London.)

References.—Davidson, Davis, and Innes (1943) *Edinb. med. J.* 50, 226, 355, and 431. Davis, Davidson, Riding, and Shaw (1943) *Brit. med. J.* 1, 655.)

Implantation Tablets.—Specially prepared tablets are now available for the subcutaneous implantation of steroid hormones. They are available as pure, compressed pellets of desoxy corticosterone, oestradiol, testosterone and progesterone. (Organon Laboratories Ltd., Brettenham House, Lancaster Place, London, W.C.2.)

Insulin A.B..—H-A-B Insulin has now been discontinued. Insulin A.B. in new packings is now being supplied on all orders for H-A-B Insulin at prices lower than those at which H-A-B Insulin was sold. (Joint Licensees and Manufacturers: Allen & Hanburys Ltd., Bethnal Green, London, E.2; The British Drug Houses Ltd., Graham Street, London, N.1.)

Isobrom.—Tablets containing 5 gr. of bromisovalerylurea each. A non-toxic mild hypnotic and sedative. Dosage: As a soporific, 1 or 2 tablets immediately before retiring; as a sedative, 1 tablet 3 to 4 times a day. (Clinical Products Ltd., 2, The Green, Richmond, Surrey.)

Laxative, 'Tabloid'.—A sugar-coated compressed product presenting a combination of vegetable purgatives (colocynthis, aloes, and podophyllin), with hyoscyamus and menthol to modify any griping tendency. 'Tabloid' Laxative has been introduced to take the place of 'Tabloid' Laxative Vegetable, which owing to shortage of certain constituents will not be available for the duration of the war. Issued in bottles of 25, 100, and 500 products. (Burroughs Wellcome & Co. (The Wellcome Foundation Ltd.). Temporary War-time Address: 12, Red Lion Square, London, W.C.1.)

Leptospira Diagnostic Antigen (Lederle).—For the rapid plate determination of significant agglutinins for *Leptospira canicola* and *Leptospira icterohemorrhagiae* in clear serum (Stuttgart's disease in the dog and Weil's disease in man). Each package of Leptospira Antigen contains one 5-c.c. vial each of *Leptospira canicola*, *Leptospira icterohemorrhagiae*, bivalent positive serum, also three 5-c.c. dilution vials. Manufactured by Lederle Laboratories Inc., New York. (Details on application to sole distributors, Chas. F. Thackray Ltd., 10, Park Street, Leeds, 1, and 262, Regent Street, London, W.1.)

Linguets.—Clinical investigation having shown that absorption from the rich capillary network under the tongue is more effective than from the intestinal tract, the Ciba sex hormones, Perandren (male) and Lutocyclin and Ovocylin (female) are now issued in the form of Linguets for sublingual administration, ensuring that the hormone is not destroyed either by intestinal ferments or, as it enters directly into the systemic circulation, by the liver before exerting its effect. Linguets are placed under the tongue or between the upper lip and gum and allowed to dissolve slowly. Perandren Linguets containing 5 mg. methyl testosterone are supplied in bottles of 20 and 100; Lutocyclin Linguets containing 5 mg. anhydrohydroxy progesterone (ethisterone), in bottles of 10 and 50; Ovocylin Linguets containing oestradiol in bottles of 50×0.04 mg., 30×0.1 mg., and 25×1 mg. (Ciba Limited, Horsham.)

Magtriz.—Antacid, antipeptic, antitoxic. A new and highly effective preparation for the treatment of hyperchlorhydria, peptic ulcer, intestinal toxemia, and minor digestive disturbances. Formula: magnesium trisilicate, $2\text{MgO} \cdot 3\text{SiO}_2 \cdot n\text{H}_2\text{O}$, 91 per cent; magnesium hydroxide, $\text{Mg}(\text{OH})_2$, 9 per cent. Magnesium trisilicate is attracting widespread interest in the medical profession on both sides of the Atlantic. Due to the slow rate of reaction it does not give immediate relief and the patient thus loses faith in the treatment. Magnesium hydroxide incorporated in Magtriz is just enough to give immediate relief from discomfort, without any ill effect, and its mild laxative properties are an additional help to sufferers from gastric disorders. It not only gives prompt and effective relief, but also neutralizes and adsorbs gastric acids for several hours.

Magtriz is supplied in powder form in bottles of two sizes. Dose: 1 to 2 heaped teaspoonfuls stirred in a little water, t.d.s. between meals, and on retiring. (Westminster Laboratories Ltd. Penn, Bucks.)

Meningococcus Typing Serum (Lederle).—For agglutination test or capsule swelling test where applicable. In 1-c.c. packings of Groups 1, 2, 2A, and 4 sera. Manufactured by Lederle Laboratories Inc., New York. (Details on application to sole distributors, Chas. E. Thackray Ltd., 10, Park Street, Leeds, 1, and 262, Regent Street, London, W.1.)

Menopax.—A complex oestrogenic sedative for the alleviation of menopausal disorders, containing stilbestrol and bromisovalerylurea. Dosage: 1 or 2 tablets 3 times a day. (Clinical Products Ltd., 2, The Green, Richmond, Surrey.)

Mepacrine Hydrochloride (Boots).—A synthetic acridine compound of low toxicity for the treatment of malaria. The average dosage is 0.10 g. three times a day. Supplied in tablets of 0.1 g. (Boots Pure Drug Co. Ltd., Nottingham.)

Methedrine *d*-N-Methylamphetamine Hydrochloride.—A sympathomimetic pressor agent with a prolonged action. It is available as 'Hypoloid' Methedrine for intravenous, intramuscular, or subcutaneous injection before or during operations to maintain the blood-pressure and guard against shock, particularly when spinal anaesthesia is used; a single injection suffices in the majority of cases (H. Dodd and F. Prescott, *Brit. med. J.* 1943, 1, 845). The drug is also of value as an analgetic in collapse or poisoning from overdosage of anaesthetics or narcotics or exposure to noxious gases. It is issued in boxes of 6 and 25 ampoules, each containing 30 mg. in 1.5 c.c. 'Tabloid' Methedrine, 5 mg., for oral administration as a central stimulant, is also available. (Burroughs Wellcome & Co. (The Wellcome Foundation Ltd.). Temporary War-time Address: 12, Red Lion Square, London, W.C.1.)

Metuvit with Cod-liver Oil.—A combination of ray-active Metuvit ointment with cod-liver oil. Particularly indicated in opened and contaminated wounds, opened abscesses, varicose ulcers, etc. Packings: Tubes of 1 oz.; jars of 8 oz. (Camden Chemical Co. Ltd., Northington Street, London, W.C.1.)

Metuvit with Cod-liver Oil and Sulphanilamide.—A combination of ray-active Metuvit and cod-liver oil, with the antiseptic properties of sulphanilamide. Packings: Tubes of 1 oz.; jars of 8 oz. (Camden Chemical Co. Ltd., Northington Street, London, W.C.1.)

'Monoject' Ampoule Syringe.—An ingenious unit injection device presenting a single parenteral dose of sterile solution of morphine or other drug, sealed in a collapsible tube with a welded closure and a sterile hypodermic needle mounted in the nozzle. The needle is protected from damage and contamination by a neat plastic cap which is threaded and sealed on to the nozzle of the tube. The entire output of 'Monoject' products is at present reserved for the Armed Forces, but the manufacturers hope to be able to meet civilian requirements in the near future. (Burroughs Wellcome & Co. (The Wellcome Foundation Ltd.). Temporary War-time Address; 12, Red Lion Square, London, W.C.1.)

Morhulin Ointment.—The original external cod-liver oil therapy. Indications: Wounds and skin injuries of every description. Dermatitis, varicose ulcer, boils, bed-sores, etc. First degree burns, second and third degree burns in the healing stage. Composition: chlorinated cod-liver oil 11.4 per cent, zinc oxide 45 per cent, incorporated in a suitable ointment base. The cod-liver oil content provides the necessary unsaturated fatty acids and vitamins, essential to normal skin metabolism, thus promoting rapid granulation and epithelialization. Directions for use: Spread on clean dressing material to a thickness of $\frac{1}{8}$ in. and apply to the affected part. The ointment should also cover an area of 1 in. all around the affected part. (Priory Laboratories Ltd., 21, Eastbury Road, Northwood, Middlesex.)

Morhulin Powder.—Composition: Chlorinated cod-liver oil 1.5 per cent incorporated in a compound talc base. Indications: Medical and surgical dressing powder for the alleviation of skin irritations and as an adjunct to Morhulin Ointment. A cooling and soothing dusting powder in the care of infants. (Priory Laboratories Ltd., 21, Eastbury Road, Northwood, Middlesex.)

Multivite.—The formula for Multivite pellets has been modified and improved. Owing to wartime conditions it has been necessary to decrease the amount of vitamin A in Multivite pellets. Other alterations have been carried out, the final result of which is an improved product. The new formula is as follows: Vitamin A, 2500 international units; Vitamin B₁, 160 international units; Vitamin C, 250 international units; Vitamin D₂, 250 international units. (The British Drug Houses Ltd., Graham Street, London, N.1.)

Neo-Hombreol Suppositories.—Each containing 15 mg. of testosterone. These are recommended where local treatment is required for hypogonad males, where they are used rectally every night, and also in cases of metrorrhagia and menorrhagia in women where nightly rectal insertion is also recommended up to a maximum of 20 suppositories in any one month. (Organon Laboratories Ltd., Brettenham House, Lancaster Place, London, W.C.2.)

Nicotinamide (B. W. & Co.)—The naturally-occurring form of nicotinic acid, the pellagra-preventing factor of the vitamin B complex; particularly indicated in cases where the vasodilator actions of nicotinic acid are undesired. Issued as 'Hypoloid' Nicotinamide, for parenteral administration, in boxes of 6 ampoules each containing 50 mg. in 1 c.c.; and as 'Tabloid' Nicotinamide, compressed products for oral administration, each containing 50 mg. in bottles of 25, 100, and 500. (Burroughs Wellcome & Co. (The Wellcome Foundation Ltd.). Temporary War-time Address: 12, Red Lion Square, London, W.C.1.)

Nupercaine Suppositories.—The use of Nupercaine as a surface anæsthetic is well known, and its application to mucous membranes results in an action of intensity fully equal to that of cocaine and of greater duration. As an alternative to Nupercaine Oily Solution for infiltration, or Nupercaine (1 per cent Nupercaine Ointment), Nupercaine Suppositories have been introduced for the treatment of anal fissure and painful hæmorrhoids where a prolonged action is desired or where this form of medication is preferred. Suppositories of 0.012 g. in boxes of 5. (Ciba Limited, Horsham.)

Paraetol.—Betaine-glutamine-hydrochloride. For the treatment of gastric disturbances due to an insufficiency of hydrochloric acid. In powder. Packings: Boxes of 10×3 g. and 20×3 g. (Camden Chemical Co. Ltd., Northington Street, London, W.C.1.)

Pelonin Amide.—Nicotinamide. Tablets and 2-c.c. ampoules containing 50 mg. The P.P. factor. (Glaxo Laboratories Ltd., Greenford, Middlesex.)

Perphyllon.—Adoriphyllin. For the treatment of asthma and emphysema. Packings: Ampoules 3×2 c.c., and 50×2 c.c.; suppositories, boxes of 5 or 20; cachets, boxes of 10 or 100. (Camden Chemical Co. Ltd., Northington Street, London, W.C.1.)

Pethidine Hydrochloride (Roche).—Pethidine, the name for the ethyl ester of *l*-methyl-4-phenyl-piperidine-4-carboxylic acid, has recently been studied for its analgesic and spasmolytic effect in labour. Larger doses have been advocated by some investigators, and as a result Pethidine Hydrochloride Ampoules of 100 mg. in 2 c.c. are now available in packings of 12 and 100. Pethidine is also available in tablets of 25 mg. in 25's, 100's, and 500's, and in ampoules of 50-mg. boxes of 12 and 100. (Roche Products Ltd., Welwyn Garden City.)

Pheniodol Granules (Glaxo).—Pheniodol, 3 g., in 6 g. of granules. Powder 25 g. For radiography of gall-bladder. (Glaxo Laboratories Ltd., Greenford, Middlesex.)

Pheniodol Meal B.D.H.—In addition to Pheniodol B.D.H. previously described, this cholecystographic agent is now available as a specially-prepared meal containing 50 per cent of Pheniodol B.D.H. together with suspending and flavouring agents for the ready preparation of a suspension for oral administration. Tubes containing one dose are available in boxes containing one or six tubes. (The British Drug Houses Ltd., Graham Street, London, N.1.)

Pheniodol 'Wellcome'—A stable organic compound containing 51.5 per cent of iodine, for oral administration as a contrast agent in cholecystography. Clinical experience has shown it to be highly satisfactory for this purpose, giving clear, well-defined shadows and causing a minimum of gastro-intestinal or systemic disturbance. Issued as 'Wellcome' Pheniodol, in bottles of 25 g. and as 'Wellcome' Pheniodol Meal in tubes of 4.5 g. (=3 g. of Pheniodol), issued singly and in cartons of 6. (Burroughs Wellcome & Co. (The Wellcome Foundation Ltd.). Temporary War-time Address: 12, Red Lion Square, London, W.C.1.)

Phytoferol Capsules B.D.H.—These capsules now contain mixed tocopherols in an amount equivalent to 6 mg. of synthetic *dl*- α -tocopherol. (The British Drug Houses Ltd., Graham Street, London, N.1.)

Plexan.—'Crude' liver extract. For macrocytic anaemia. (Glaxo Laboratories Ltd., Greenford, Middlesex.)

Prostigmin.—The classic drug used in myasthenia gravis, and with many other indications in surgery and medicine, has recently undergone a substantial reduction in price. Increasing attention has been paid to the effective use of Prostigmin in the treatment of delayed period in U.S.A. and recently in this country (*B.M.J.* January 1, 1944). Prostigmin Tablets are issued in 20's, 100's, and 250's, also in ampoules of 1 c.c. containing 0.5 mg. in 6's and 50's and concentrated solution 5 c.c. (1 c.c. contains 2.5 mg.). (Roche Products Ltd., Welwyn Garden City.)

Radiostoleum.—In accordance with an order by the Ministry of Food, the strength of Radiostoleum capsules has been reduced. Each capsule now contains 4500 international units of vitamin A and 900 international units of vitamin D. (The British Drug Houses Ltd., Graham Street, London, N.1.)

Revitone with Vitamin B₁.—The manufacture of this preparation was suspended owing to war conditions, but it has now been re-introduced with a modified formula which, however, contains all the previous active ingredients; an opportunity has been taken to improve the formula by the addition of 'Benerva' Vitamin B₁ 5 mg. per oz. which, in doses of one small teaspoonful, provides 200 International Units of vitamin B₁. The other ingredients are: aneurin hydrochlor. B.P. 5 mg. (1800 I.U. Vitamin B₁); ext. kolae co. 'Roche' equiv. kola B.P.C. 5.68 g.; sod. phosph. acid. B.P. 1.41 g.; mang. chlorid. B.P.C. 2.04 mg.; arsylen (sod. allyl-arsenate 5.7 mg. equiv. arsen. trioxid. B.P.) 0.256 mg.; ext. nuc. vom. sicc. B.P. 18.1 mg. (Roche Products Ltd., Welwyn Garden City.)

Rhinofagos.—Polyvalent bacteriophages specific against staphylococci, streptococci, pneumobacilli, *B. proteus*, *B. para-coli*, *B. pyocyaneus*, enterococci. Triple therapy—nasal irrigation, throat spray or gargle, and oral administration—for catarrhal conditions and common cold. Prophylactic and therapeutic. (Medico-Biological Laboratories Ltd., Cargreen Road, South Norwood, London, S.E.25.)

Rhyso-val.—Presents a concentrated, standardized, valerian extract in dragée form, without odour or taste, and readily tolerated by both children and adults. One dragée is equivalent to 25 minims of tinct. valerianae B.P.C. The special process of manufacture ensures an unvarying uniformity of dose, with a uniformly reliable therapeutic action, having no secondary or depressing reactions. Indicated in nervous restlessness, anxiety neurosis, nervous states associated with the climacteric, etc. Dose: As a sedative—1 to 3 dragées, 3 or 4 times daily according to the condition; as a soporific—3 dragées at bedtime. (Coates & Cooper Ltd., 21, Eastbury Road, Northwood, Middlesex.)

Riboflavine B.D.H.—Tablets each containing 3 mg. of Riboflavine B.D.H. (vitamin B₂) have been added to the range of preparations of this vitamin now available. (The British Drug Houses Ltd., Graham Street, London, N.1.)

Rose Hip Syrup (Pabyrn).—This palatable syrup contains approximately 200 mg. ascorbic acid (vitamin C) in each 100 mls, together with appreciable quantities of vitamins K and P. It is therefore of value in all vitamin C deficiency conditions, and because of its pleasant honey-like flavour, is particularly suitable for administration to children. Pabyrn Rose Hip Syrup is packed in 8-oz. bottles. (Paines & Byrne Ltd., Pabyrn Laboratories, Bilton Road, Greenford, Middlesex.)

S.B.T. (Hewlett's).—For the treatment of arthritis, particularly the infective types. It is a sterilized solution of Howards' 'Sobita' brand of Bismuth. et Sodii Tart. B.P., Add. 1886, specially prepared under medical direction and supervision to the formula and methods of Dr. Percy Hall (*Lancet*, February 19, 1944, p. 264). S.B.T. will be found to be particularly valuable in the infective types of arthritis, including rheumatoid. Cases of osteo-arthritis which have an infective element will also benefit. Injections should be given deeply into the gluteal muscles, with the usual aseptic precautions. Dosage: The average initial dose is 1 gr. (1 c.c.) repeated in a fortnight. The interval between doses is gradually increased up to about 6 weeks. A full course of injections is twelve doses. For further particulars, see special literature. Packing: Rubber-capped bottles of 10 c.c. (C. J. Hewlett & Son Ltd., London, E.C.2.)

Sodium Sulphacetamide Cream (Evans).—A bland neutral cream containing 10 per cent sodium sulphacetamide in solution. For the treatment of burns, wounds, ulcers, etc. After cleansing the site the cream is applied thickly on gauze or lint and reapplied when necessary. Issued in tubes of 2 oz. (Evans Sons Lescher and Webb, Liverpool and London.)

Sodium Sulphacetamide Eye Drops (Evans).—10 per cent and 30 per cent. Prepared and sterilized for the prophylaxis and treatment of industrial eye injuries, hypopyon ulcers, etc. Immediate application is advised after injury. In treatment frequent application of one or two drops is necessary. Dropper bottles of 30 c.c. (Evans Sons Lescher and Webb, Liverpool and London.)

Sodium Sulphacetamide Eye Ointment (Evans).—Aseptically prepared for ophthalmic use. The readily absorbed base contains 10 per cent sodium sulphacetamide in solution. Indicated in low-grade and chronic infections of the eye. Issued in tubes of 1 drachm. (Evans Sons Lescher and Webb, Liverpool and London.)

Sodium Sulphacetamide Powder (Evans).—For application to the eye in case of wounds. Issued in bottles of $\frac{1}{2}$ oz., 1 oz., and 4 oz. (Evans Sons Lescher and Webb, Liverpool and London.)

Sodium Sulphacetamide Solution (Evans).—30 per cent sodium sulphacetamide in ampoules of 5 c.c. For intravenous injection to supplement oral sulphacetamide therapy in gonorrhoea and bacillary infections of the urinary tract. Also as an adjunct to general oral chemotherapy. Issued in boxes of 6×5-c.c. ampoules. (Evans Sons Lescher and Webb, Liverpool and London.)

Solution Sodium Sulfadiazine (Lederle).—Each ampoule contains 10 c.c. of a 25 per cent solution, and must be diluted with 4 parts (40 c.c.) of sterile distilled water before intravenous administration. Packed in 6 ampoules of 10 c.c. and 25 ampoules of 10 c.c. Manufactured by Lederle Laboratories Inc., New York. (Details on application to sole distributors, Chas. F. Thackray Ltd., 10, Park Street, Leeds, 1, and 252, Regent Street, London, W.1.)

Solvochin. —Water-soluble quinine. For painless parenteral quinine treatment in cases of malaria. Packings : For adults : Ampoules in boxes of 3×2.2 c.c., 12×2.2 c.c., and 50×2.2 c.c. For children : Ampoules in boxes of 6×1.1 c.c. and 50×1.1 c.c. (Camden Chemical Co. Ltd., Northington Street, London, W.C.1.)

Steramide Brand of Sulphacetamide. —A sulphonamide derivative for the treatment of the urinary tract and infective conditions of the eye ; and also for prophylaxis in the treatment of eye injuries. (Ward, Blenkinsop & Co. Ltd., Brooklands, Halewood, Liverpool.)

Sterile Sulphanilamide. —A free-flowing sterilized sulphanilamide powder (10 g.) in a glass sprinkler bottle, itself within a sterile cardboard container. This consists of two cylindrical halves readily separated so that the surgeon may withdraw the sterile bottle and use the contents with complete asepsis. For theatre use after wound excision and all surgical procedures. (Genatosan Ltd., Loughborough.)

Stillbestrol Dipalmitate (Crookes) (Syn. *Stillbestrol DPL Crookes*). —Stillbestrol DPL Crookes is a solution of the material in sesame oil prepared for intramuscular injection. Its advantages over stilbestrol lies in its prolonged action and absence of nausea and other toxic reactions. The product is used, like stilbestrol, in the treatment of menopausal disturbances and other conditions arising from ovarian insufficiencies. The dosage is 1 to 5 mg. twice or thrice weekly. (The Crookes Laboratories, Gorst Road, Park Royal, London, N.W.10.)

Stimatone. —Pholedrine. A circulatory stimulant and restorative. (Ward, Blenkinsop & Co. Ltd., Brooklands, Halewood, Liverpool.)

Streptococcus Grouping Sera 'Wellcome'. —These sera are suitable for use in any of the standard methods for grouping streptococci according to the Lancefield classification. The full range of nine grouping sera (groups A, B, C, D, E, F, G, H and K) is available, each in containers of 1 c.c. and 5 c.c. Instructions for use accompany each packing. (Burroughs Wellcome & Co. (The Wellcome Foundation Ltd.). Temporary War-time Address : 12, Red Lion Square, London, W.C.1.)

Sufectan (Wyleys). —A free-flowing surgical dusting powder containing sulphanilamide 20 per cent, urea 30 per cent, urea-formaldehyde compound 10 per cent, in a kaolin-talc base. Designed to meet the need for a dusting powder containing sulphanilamide which would not only possess a high degree of bacteriostatic efficiency but would also remain sterile *in situ*. Clinical evidence has shown that when sulphanilamide is associated with urea, the bacteriostatic activity is increased and the toxic reaction is usually less pronounced. Strains of streptococci and staphylococci which are unaffected by sulphanilamide or urea alone are very susceptible to sulphanilamide-urea. The urea, in addition to counteracting sulphanilamide inhibitors, assists the healing of infected wounds by removing the necrotic tissue, and the splitting off of formaldehyde from the urea-formaldehyde compound maintains a definite degree of sterility. The employment of Sufectan is indicated for topical application to wounds, burns, skin lesions, operation cavities, etc. Sufectan is supplied in 2-oz. sprinkler tins. (Wyleys Ltd., Coventry.)

Sulfadiazine Surgical Powder (Lederle). —This is 2-sulfanilamide pyrimidine, without added diluent or excipient. The powder should be lightly dusted, or 'frosted' over the injured surface and the area lightly covered with sterile dressings. Dosage should not exceed 5 g. in any one area, or 10 g. in any one patient during 24 hours. The powder is packed in 5-g. glass vials sealed against moisture. Complete sterility of the powder has been obtained by methods studied at the Lederle Laboratories for over a year prior to commercial production. Manufactured by Lederle Laboratories Inc., New York. (Details on application to sole distributors, Chas. F. Thackray Ltd., 10, Park Street, Leeds, 1, and 252, Regent Street, London, W.1.)

Sulfex. —A suspension of micro-crystalline (Mickraform) sulphathiazole, 5 per cent, in an isotonic solution of *p*-hydroxy- α -methylphenylethyamine hydrobromide (Paredrinex), 1 per cent. Sulfex combines, for the first time, in a single chemically stable suspension, the potent bacteriostatic action of sulphathiazole and the effective vasoconstriction of Paredrinex. The crystals of Mickraform sulphathiazole—many hundred times smaller in mass than the ordinary commercial crystals—are not quickly washed away from infected areas, but remain *in situ* as a fine, even frosting which exerts sustained bacteriostasis. The rapid, prolonged, and complete shrinkage action of Paredrinex renders the infected areas readily accessible to the sulphathiazole and achieves maximum ventilation and drainage. Sulfex is indicated in acute nasal and sinus infections, particularly those secondary to the common cold, and in pharyngolaryngeal sore throat. It is available in 1-oz. bottles with dropper for intranasal administration. (Menley & James, Ltd., 123, Coldharbour Lane, London, S.E.5.)

Sulphacetamide Tablets (Evans).—Each tablet contains 0.5 gr. sulphacetamide. For the treatment of gonorrhoea and bacillary infections of the urinary tract. Issued in tubes of 20. (Evans Sons Lescher and Webb, Liverpool and London.)

Sulphaguanidine (Ward, Blenkinsop).—A sulphonamide derivative, for use in the treatment of bacillary dysentery and other infections of the intestinal tract, and for prophylaxis in surgical procedure upon the large intestine. (Ward, Blenkinsop & Co. Ltd., Brooklands, Halewood, Liverpool.)

Sulphanilamide Cream (A.B.S.).—A non-greasy ointment-cream containing 5 per cent sulphanilamide together with allantoin and benzocaine, incorporated in a water-miscible base. A useful application for wounds, infected or ulcerated surfaces, skin affections such as impetigo, etc., and a valuable adjunct in the plenary treatment of burns and scalds. (Genatosan Ltd., Loughborough.)

Sulphanilamide Tulle (Optrex Brand).—A new type of continuous strip surgical dressing consisting of an open mesh gauze ($\frac{1}{16}$ in.) impregnated with an emulsion containing 10 per cent sulphanilamide. Issued in two sizes, $3\frac{1}{2}$ in. wide and 5 yards long, and 2 in. wide and 10 yd. long. Indications: primary dressing for wounds clean or septic; treatment of infected wounds or sores; primary and secondary dressing for burns. (Sole distributors: Chas. F. Thackray Ltd., 10, Park Street, Leeds, 1. Manufacturers: Optrex Ltd., Wadsworth Road, Perivale, Middlesex.)

Sulphathiazole (Boots).—A rapidly absorbed and relatively non-toxic sulphonamide for the treatment of staphylococcal, pneumococcal, meningococcal and gonococcal infections. Supplied in tablets of 0.5 g. ($7\frac{1}{2}$ gr.). (Boots Pure Drug Co., Ltd. Nottingham.)

Sulphonapast (Medium and Stiff).—The Sulphonamide-P B.D.H. Pastes formerly issued under this name are now issued under the name Sulphonapast. (The British Drug Houses Ltd., Graham Street, London, N.1.)

Syntropan.—Syntropan is an antispasmodic containing acid phosphate of dimethyl-di-ethyl-amino-propanol, ester of tropic acid. Owing to the war it has been unobtainable for some time, but it is again available in limited quantities as oral tablets in 20's only. Syntropan acts like papaverine directly on the muscle and peripherally through the vagus like atropine; in therapeutic doses, however, it has little or no effect on the accommodation, pulse, or salivary glands; it has a wide safety-margin. (Roche Products Ltd., Welwyn Garden City.)

Tampovagan Pessaries.—For vaginal administration. With ichthylol 5 per cent and 10 per cent lactic acid 5 per cent. (Camden Chemical Co. Ltd., Northington Street, London, W.C.1.)

Thiouracil.—A derivative of thiourea, for the treatment of thyrotoxicosis. (Ward, Blenkinsop & Co. Ltd., Brooklands, Halewood, Liverpool.)

Thiouracil B.D.H.—Thiouracil is being used experimentally under controlled conditions for the treatment of hyperthyroid conditions, thyrotoxicosis, etc. The use of this substance appears to represent a new principle in medicine in that thiouracil (2-thio-6-oxypyrimidine) inhibits the synthesis of the thyroid hormone by the thyroid gland. It appears to have no action on the anterior pituitary gland (thyrotropin secretion is not inhibited), and preformed stores of thyroglobin are used up before the effect of treatment becomes apparent. Thiouracil B.D.H. is not yet available for general use, but is issued in tablets each containing 0.2 g. for controlled clinical trial. (The British Drug Houses Ltd., Graham Street, London, N.1.)

Thiourea and Thiouracil.—Both substances have been shown to be strikingly effective in the treatment of thyrotoxicosis. The oral administration of either in appropriate dosage rapidly brings about a general abatement of symptoms consisting of a fall in pulse-rate, reduction in basal metabolic rate, and rise in body weight and in serum cholesterol. No toxic effects have been recorded. Thiourea is available in 5-gr. tablets and thiouracil in 1½-gr. tablets. Dosage of thiourea: 1 to 2 g. daily (3 to 6 tablets); dosage of thiouracil: 0.2 to 1 g. daily (2 to 10 tablets). (Genatosan Ltd., Loughborough.)

Transpulmin.—Quinine and camphor. For the treatment of pulmonary and bronchial affections. Packings: For adults: Ampoules 5×2 c.c., 10×2 c.c., and 50×2 c.c.; For children: Ampoules 6×1.2 c.c., 12×1.2 c.c., and 75×1.2 c.c. (Camden Chemical Co. Ltd., Northington Street, London, W.C.1.)

Trentabs.—Analgesic tablets containing phenacetin, acetylsal. acid, laxative spa salt, with codeine phosph. 0.99 per cent. Packings: Vials of 10 tablets $\frac{1}{2}$ g. ($7\frac{1}{2}$ gr.) and 10 tablets 1 g. Bottles of 100, 250, 500, and 1000 tablets. (Camden Chemical Co. Ltd., Northington Street, London, W.C.1.)

Valogen.—Valogen is a reconstructive tonic containing extract of yeast providing vitamins of the vitamin B group together with added amounts of vitamin B₁ and nicotinamide, iron, and traces of copper, cobalt, and manganese. Valogen is issued in bottles of 4, 16, and 80 fl. oz. (The British Drug Houses Ltd., Graham Street, London, N.1.)

Viacutan.—Silver dinaphthylmethane disulphonate. A compound of silver with a synthetic tanning agent, for use in the treatment of burns. (Ward, Blenkinsop & Co. Ltd., Brooklands, Halewood, Liverpool.)

Vitamin B₁ B.D.H.—Tablets each containing 8 mg. of aneurine hydrochloride for oral administration have been added to the range of preparations available of this vitamin. (The British Drug Houses Ltd., Graham Street, London, N.1.)

MEDICAL AND SURGICAL APPLIANCES

Acetabulum Bur and Shaper.—Mr. Pridie has designed an acetabulum bur for shaping out the acetabulum in cases of arthrodesis of the hip where a Smith-Petersen cup is to be inserted. The debris channel in this bur makes it an efficient tool because it avoids the bur skidding effect which is encountered when using burs, since the skidding is due to accumulation of debris in the teeth.

Mr. Pridie has also designed a femoral head shaper for finishing off the femoral head into a circular mass after clearing away the osteophytes with a special cutter. (Down Bros. Ltd., 22a, Cavendish Square, London, W.1.) (See illustrations, *Advt.* p. 55.)

Apparatus for Kymographic Tubal Insufflation.—The use of utero-tubal insufflation with carbon dioxide for the determination of tubal patency or non-patency in cases of sterility (it is both diagnostic and therapeutic) is now universal. Many types of apparatus have been employed since the method was first described by Rubin in 1920. The addition of a kymograph in 1925 enabled Rubin to record the graph of the insufflation: the pattern gave definite evidence not only of normal tubal patency, function, and non-patency, but also of tubal dysfunction and pathology, e.g., spasm and stenosis. All who have used the kymograph agree that it is a most valuable adjunct. The apparatus described below is the most recent one manufactured, and it incorporates the main features first devised by Rubin and subsequently modified by Bonnet.

Carbon dioxide is supplied from a gas cylinder housed in the instrument case. Two cylinders are fitted so that one may be in use while the other is being recharged. The control panel which forms one face of the casing carries: (a) The main gas cylinder valve; (b) An open and shut cock; (c) The flow control valve with dial marked in c.c. per minute up to 100 c.c. per minute; (d) A pressure gauge to indicate when the cylinder in use requires recharging; (e) The outlet nozzle to which the rubber tube feeding the cannula is connected. Behind the panel is fitted the reducing valve mechanism which reduces the carbon dioxide supply pressure to a little above atmospheric pressure. Above the panel is fitted the kymograph or recording manometer. The pen of the kymograph records the pressure during the operation on a chart carried by a drum 9 cm. diameter \times 18 cm. high. This drum is rotated by a small synchronous motor (alternating current) and makes a revolution in approximately 5 minutes, which speed has been found by the users to be the most convenient. The record sheet or chart is scaled up to a pressure of 250 mm. of mercury and can readily be put on the drum and removed after the records have been traced by the pen of the manometer. Spaces are provided in the case for storage of the paper charts and the cannula, etc. The cannula is of the Rubin uterine type with the added Bonnet device for altering the level of the rubber nozzle or stop whereby the pressure of the stop against the external cervical os may be increased as desired. The whole apparatus is contained in a wooden case and is compact and portable. Its weight is approximately 22 lb. and its dimensions are $13\frac{1}{2} \times 12\frac{1}{2} \times 8\frac{1}{2}$ in. (Kelvin, Bottomley & Baird Ltd., Glasgow.)

Bone Calibrator.—It is often difficult during bone grafting and plating operations to estimate the correct length of screw needed to reach exactly to the further cortex of the bone. Mr. J. Crawford Adams has devised two simple instruments for measuring this accurately and described them in *The Lancet*, October 2, 1943. They consist of a stilette notched near the tip rather like a crochet hook, and a sliding pointer which indicates on a scale the depth of the drill hole prepared for the screw. The stilette is passed through the drill hole and the notch is made to engage on the distal surface of the bone. The sliding piece is then brought into contact with the graft or plate, held in the correct position by clamps. The depth of the drill hole can now be read off on the scale and the correct length of screw chosen accordingly. (Down Bros. Ltd., 22a, Cavendish Square, London, W.1.) (See illustration, *Advt.* p. 57.)

Bone-nibbling Forceps.—In the arthrodesis of the toes a powerful nibbling forceps for cutting bone and ivory pegs is desirable. In lieu of the normal type of cutting forceps which is not always entirely satisfactory for these requirements, Mr. T. T. Stamm, F.R.C.S., of Guy's Hospital, has designed a cutting forceps with an angular jaw. It is thought that this would be a useful addition to the existing patterns of bone-nibbling forceps. (Down Bros. Ltd., 22a, Cavendish Square, London, W.1.) (See illustration, *Advt.* p. 57.)

'Fishing Rod' Needle.—The method of injection of sclerosing solution into extensive varicose veins by means of a ball-pointed needle as described by Stevenson and Walker in *The Lancet*, January, 1938, is now well known. Mr. Dodd has made a modification of the original needle which, while permitting the use of a needle 24 in. long, is still capable of being sterilized in an ordinary sterilizer. This has been effected by means of an ingenious joint in the middle of the needle. The needle can be supplied in a spirit-tight carrying case. (Down Bros. Ltd., 22a, Cavendish Square, London, W.1.) (See illustration, *Advt.* p. 54.)

Gimlets for Fracture Technique.—These gimlets are used for the Roger Anderson technique for the external manipulation of fractures. The pins are screwed into position and the loose collar rests against the patient's flesh. When a satisfactory union has been achieved by manipulation the whole is encased in plaster of Paris, and at a later date, by means of the handles on the gimlets, they can be easily removed at such time as they are no longer required. (Down Bros. Ltd., 22a, Cavendish Square, London, W.1.) (See illustration, *Advt.* p. 54.)

Hand Splint for Control of Ulnar Deviation in Rheumatoid Arthritis.—A method of correcting the unsightly ulnar deviation deformity in rheumatoid arthritis is described by Fit.-Lt. D. C. Bodenham, M.B., R.A.F.V.R., in *The Lancet* of September 18, 1943, p. 354. He advocates the use of a special splint with four levers for the fingers, hinged to a plate which is attached to the plaster cast. The use of this splint encourages full use of the hand in the quiescent stage of the disease. It is made for both right and left hands. (Chas. F. Thackray Ltd., 10, Park Street, Leeds, 1, and 252, Regent Street, London, W.1.)

Handle for Guide Pins.—Mr. B. H. Burns has devised an ingenious handle with cam lock for introducing Watson-Jones's wire guide pins; the speed with which the cam lock can be released and fixed at will makes an appeal to many surgeons. (Down Bros. Ltd., 22a, Cavendish Square, London, W.1.) (See illustration, *Advt.* p. 57.)

Hibbs' Retractors.—These retractors, as seen in the illustration in the advertisement on page 56, show a set of Hibbs' Retractors for bone surgery as made for Mr. R. Watson Jones. (Down Bros. Ltd., 22a, Cavendish Square, London, W.1.)

Jaw Fracture Apparatus.—Among the modern apparatus used in the treatment of facial maxillary injuries of certain types, the most popular is undoubtedly the Clouston-Walker apparatus for the fixation of fractured mandibles. The use of this apparatus is described by Fry, Shepherd, McLeod and Parfitt in *Dental Treatment of Maxillary Facial Injuries* under the nomenclature of Roger Anderson's Pins, since this is the name applied by our American friends for pins and screws which are driven in at an angle to each other to secure fixation. This principle, however, was embodied in many bone appliances designed by Mr. Hey Groves early in the century. (Down Bros. Ltd., 22a, Cavendish Square, London, W.1.) (See illustration, *Advt.* p. 55.)

Knot Tier.—This instrument has been developed after many trials by Lt.-Col. R. I. Harris, M.C., R.C.A.M.C. With it it is possible to tie a perfect knot in stainless steel wire to a gauge of 20 and the knot ends can be broken off flush. It would appear that the difficulty of knotting and tying such metals as stainless steel has now been overcome. (Down Bros. Ltd., 22a, Cavendish Square, London, W.1.) (See illustrations, *Advt.* p. 56.)

Nail and Nail-plate for Fractures.—For operations on per-trochanteric fractures use has been made of the Smith-Petersen nail in combination with a flanged plate. Recently Mr. G. K. McKee of Norwich, in *The Lancet*, January 29, 1944, has described a plate of his invention which can be attached to a triffin nail by means of a co-adaptation screw.

Mr. Norman Capener has devised a V-shaped nail to which is joined a long metal bone plate combined in one piece; he has described its use in *The Lancet*, February 12, 1944. (Down Bros. Ltd., 22a, Cavendish Square, London, W.1.) (See illustrations, *Advt.* p. 56.)

Padgett's Dermatome.—Originally made in America, this machine, for cutting calibrated skin grafts, is now made in England. An annotation appeared in *The Lancet* of April 24, 1943, p. 532, describing the British-made model, which is an improvement on its American prototype. The British machine (Regd. No. 840053) has an improved calibrating device with a "noise click" for each calibration, enabling the surgeon to vary the thickness of the graft with exactitude. A special holder (Regd. No. 840052) has also been made for holding the Dermatome blade when honing is required. (Chas. F. Thackray Ltd., 10, Park Street, Leeds, 1, and 252, Regent Street, London, W.1.)

Punch for Plating Fractures.—Mr. Norman Capener, F.R.C.S., of Exeter, has described in *The Lancet*, October 2, 1943, a simple punch for use in plating fractures. It is an adaptation of a commercial pattern. He states: "The use of special stainless alloys renders it more than ever necessary that the drill holes in bones for the insertion of screws should be perfectly centred in the opening of the metal plates. If not so centred drills may cut eccentric holes, thus not only damaging the edge of the metal plates but also giving the screw an imperfect hold upon the plate."

The instrument (which is illustrated on p. 56) is a spring-loaded punch sold to the engineering trade. No hammer is needed for making the impression of the punch on the bone. Pressure on the handle releases a spring, the tension of which is adjustable; the point of the instrument then makes a small hollow in the bone against which the drill may be applied. This is modified by a further spring attached to the point, with a collar that fits into the bone plate screw hole and ensures that the point of the punch is centred accurately. A lengthening handle has also been attached, which enables the instrument to be used with less risk of the surgeon's hand coming in contact with the wound. When the fracture has been reduced and the metal plate is firmly applied and held in position, it is a matter of seconds to punch accurately six or eight drill points; with an electric drill the most tedious part of the operation is then very quickly and efficiently performed." (Down Bros. Ltd., 22a, Cavendish Square, London, W.1.)

Screw-driver.—Mr. B. H. Burns has had made a screw-driver which firmly holds the screw in position with the screw-driver and screw as one piece during the original insertion. When the bone screw is practically home it can be released from the holder and final turns made by the turn-screw which then projects through the end of the instrument. (Down Bros. Ltd., 22a, Cavendish Square, London, W.1.) (See illustration, *Advt.* p. 54.)

Screw-holding Forceps.—For Col. R. I. Harris of Toronto a slight but useful modification of Lane's screw-holding forceps has been made. The instrument is now furnished with chamfered edges which enables it to be used for steadying the screw to the final turn of the screw-driver, thus possessing a mechanical advantage over the original model. (Down Bros. Ltd., 22a, Cavendish Square, London, W.1.) (See illustration, *Advt.* p. 55.)

Smillie Cartilage Knives.—Mr. Smillie states that the anterior horn of the cartilage is mobilized in the usual way by passing the point of the scalpel between the head of the tibia and the under surface of the cartilage. The central attachment of the anterior horn is then divided and the free end gripped securely with a Martin's meniscus forceps.

The anterior half of the cartilage may now be completely mobilized by visual scalpel dissection. The portion of the cartilage immediately internal to the medial collateral ligament is mobilized using the straight chisel-type cartilage knife, the medial collateral ligament being guarded by the

retractor. The attachments of the posterior third of the cartilage to the capsule are divided using the curved knife, the convexity of the curve directed towards the middle of the joint and the longer beak of the knife resting on the upper medial edge of the tibial table. Division of the attachment is facilitated if the traction on the anterior horn is directed somewhat towards the middle of the joint. This is the most difficult part of the operation and patience spent in mobilizing the posterior third is amply rewarded.

It should now be possible to dislocate the entire cartilage into the centre of the joint. The central attachment of the posterior horn is usually easily visible and is divided using the second of the curved knives, the concavity of which faces towards the medial collateral ligament, the longer beak resting on the articular cartilage of the tibial table. The long beak of the knife is thrust beneath the posterior horn and the knife pushed directly backwards under direct vision.

In certain cases, especially where an error of diagnosis has been made, it will be found that the mobilization of the posterior third of the cartilage is difficult due to its firm attachment to the posterior capsule. If, in spite of using the curved knives, complete mobilization of the posterior third and dislocation of the cartilage into the intercondylar notch is impossible, the central attachment of the posterior horn is divided under direct vision, after which it will be found that the cartilage can be pulled forward and the attachment to the posterior capsule brought within easy range of the curved knife.

With a little experience of the use of these instruments it should be possible to remove the entire cartilage on every occasion through a small anterior incision. (Down Bros. Ltd., 22a, Cavendish Square, London, W.1.) (See illustration, *Advt.* p. 57.)

Table-knife Holder.—Mr. J. Carlton Heal of Exeter has designed a very ingenious table-knife holder, which was originally carried out for his personal use when recovering from a traumatic lesion of the left motor cortex. It is thought it would be of service in cases of partial recovery from hemiplegia and nerve lesions and advanced rheumatoid arthritis. He states: "After damage to the motor cortex after pyramidal lesion, when the hand has partially recovered, the simple grasp may be quite strong but the higher 'movement patterns' which are developed latest, are lost (cf. Wartenberg's sign). To hold an ordinary table knife correctly may be regarded as the 'acid test' of recovery of hand and finger movement. In order to use one, the three inner fingers must be fully flexed, the index partially extended and abducted, and the thumb opposed with the proximal joint flexed and distal joint distended. Moreover all these movements must be done very firmly. This little gadget (the illustration of which is self explanatory) embodies a ring through which the index finger is slipped and a trough to steady it. It is made by Messrs. Down Bros. Ltd., London, and is light and handy, and is ingeniously designed to clip quickly on and off any small table knife." (Down Bros. Ltd., 22a, Cavendish Square, London, W.1.) (See illustration, *Advt.* p. 54.)

Transfusion Syringe.—Dr. L. Rosenthal, in the *British Medical Journal* of December 11, 1943, p. 749, published a description of a new syringe for blood and saline transfusion (Regd. design 840962). It is an ordinary 1-c.c. Record syringe having a hollow piston and piston stem with a two-way tap and a tubing mount on the proximal end of the stem. Rubber tubing from the reservoir containing the transfusion fluid is connected to the hollow piston stem. The syringe, with needle attached, is then used as a vein seeker. Once a suitable vein is entered, the tap on the piston stem is opened to allow transfusion to take place, no further manipulations being necessary except to strap the syringe to the limb. Its glass barrel acts as a "window". In addition to transfusions the syringe should also be useful in continuous intravenous anaesthesia. (Chas. F. Thackray Ltd., 10, Park Street, Leeds, 1, and 252, Regent Street, London, W.1.) (See illustration, *Advt.* p. vi.)

Watson Apparatus for Mass Miniature Radiography.—The apparatus described was designed in collaboration with the Medical Research Council and has been adopted in the Government scheme for mass radiographic examination of the chest with a view to detecting pulmonary tuberculosis and other chest pathology in its early stages, before clinical signs make themselves evident. The Report of the Advisory Committee on Tuberculosis—Mass Radiology Sub-Committee—includes this statement: "We must therefore state emphatically that it is of the greatest importance for the success of mass radiography that the examination of large numbers of persons by improvised apparatus should be strongly discouraged and that the official scheme at least should only use the standard apparatus according to the methods recommended in this report."

In the design of the Watson apparatus, the quality of the end-result has been the first consideration, and as a result the projected image of the 35-mm. films attains a very high standard. A 4-valve transformer, having a maximum capacity of 400 ma., 100 kv. (peak) energizes a Maellett "Dynamax" rotating anode tube, the latter being mounted on a tube stand attached to the top of the transformer. The fluorescent image is photographed by a camera having a lens aperture of f. 1.5 placed at the end of a light-tight tunnel. At the same time as the exposure is made the number on the examinee's card is photographed on to the film, and a system of interlocking contacts ensures that the film cannot be exposed unless the card is correctly in place. The camera is operated electrically from the control table by the same control as that which energizes the X-ray tube and embodies several electrical interlocking devices which preclude any possibility of spoiled films except those due to incorrect technique. The X-ray tube is automatically centred on the fluorescent screen when the latter is adjusted to the height of the patient, and under working conditions as many as 200 exposures can be made in an hour.

The apparatus is also suitable for normal chest radiography (full size) at distances up to 6 feet. It is specially arranged so that it can be installed rapidly in temporary quarters if necessary, and can be transported in an ordinary vehicle without difficulty. (Watson & Sons (Electro-medical) Ltd. Temporary Address: 76, Castle Street, Reading, Berkshire.)

BOOKS OF THE YEAR.

A LIST OF ENGLISH AND AMERICAN MEDICAL WORKS AND NEW EDITIONS
PUBLISHED DURING THE TWELVE MONTHS ENDING DECEMBER, 1943

*For the convenience of our readers any of the works in this list can be obtained through
John Wright & Sons Ltd., Publishers of the 'Medical Annual',
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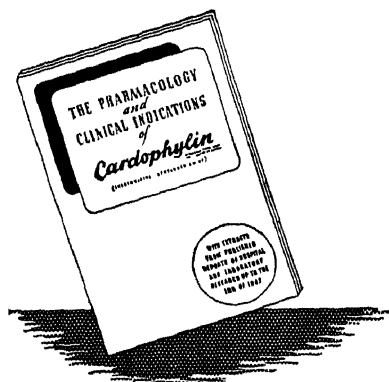
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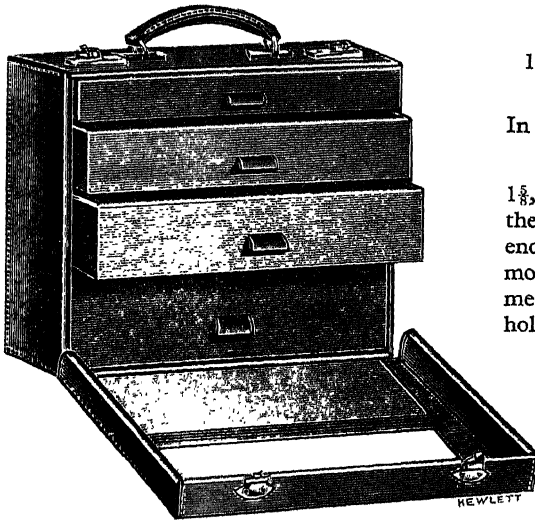
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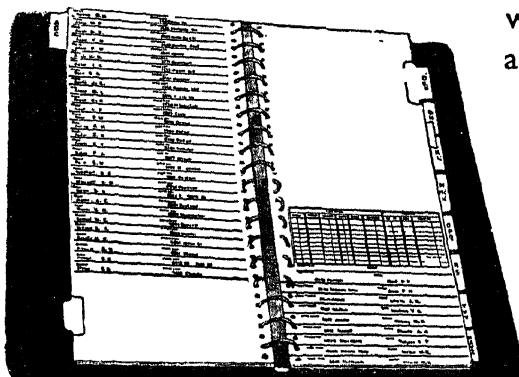
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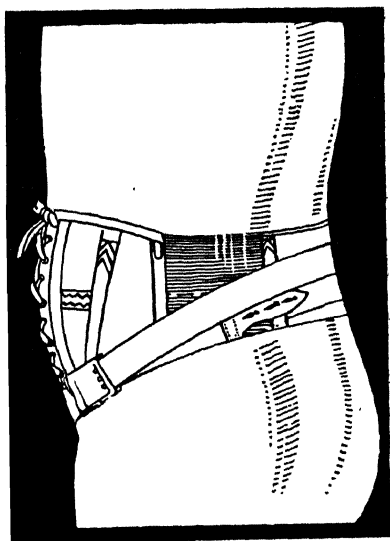
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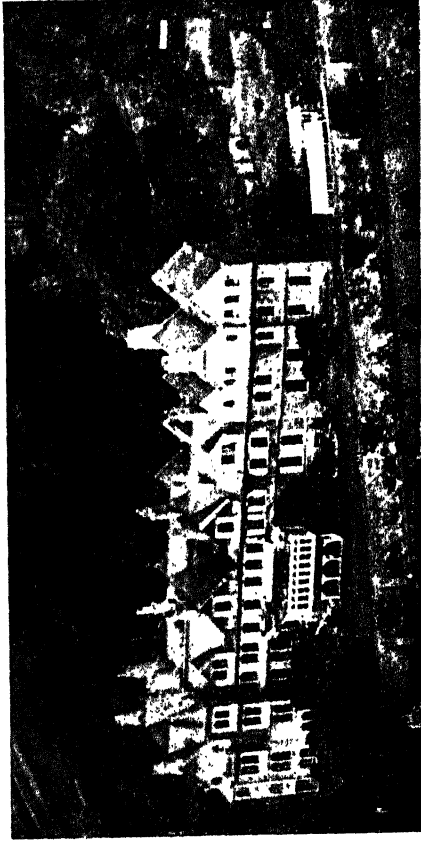
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For Nervous and Mental Disorders

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President : The Most Hon. the MARQUESS OF EXETER, K.G., C.M.G., A.D.C.

Medical Superintendent : THOMAS TENNENT, M.D., F.R.C.P., D.P.H., D.P.M.

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Cases under certificate, voluntary, and temporary Patients received for treatment.

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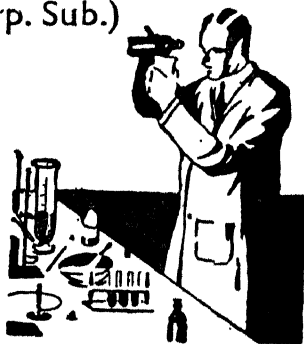
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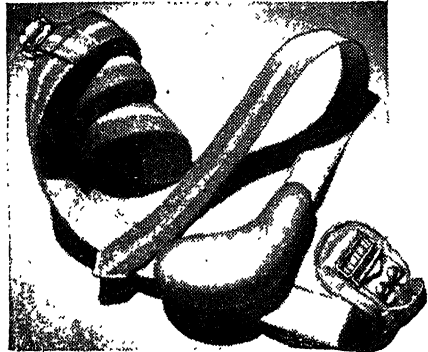
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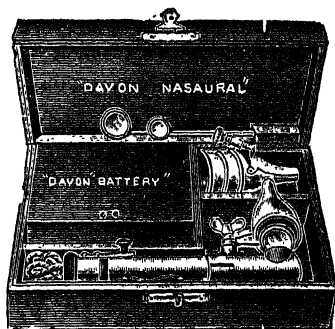
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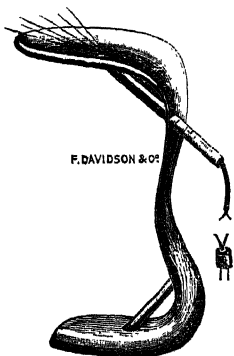
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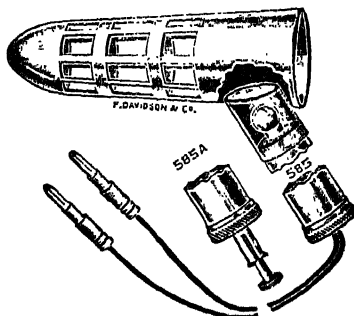
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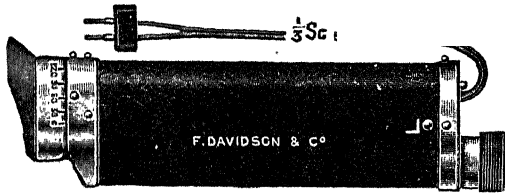


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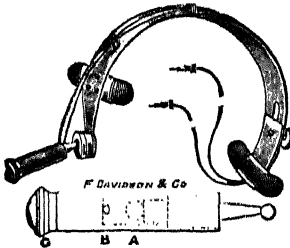
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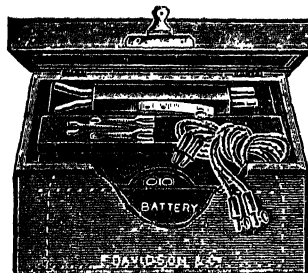
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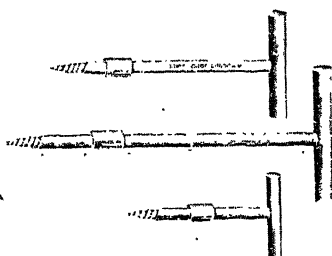
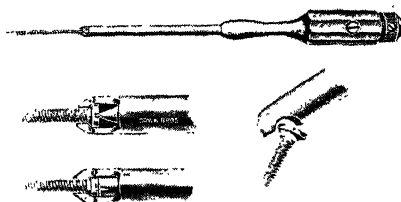
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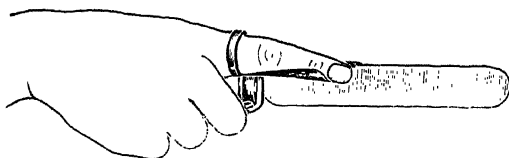


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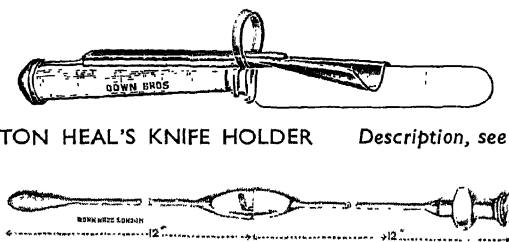
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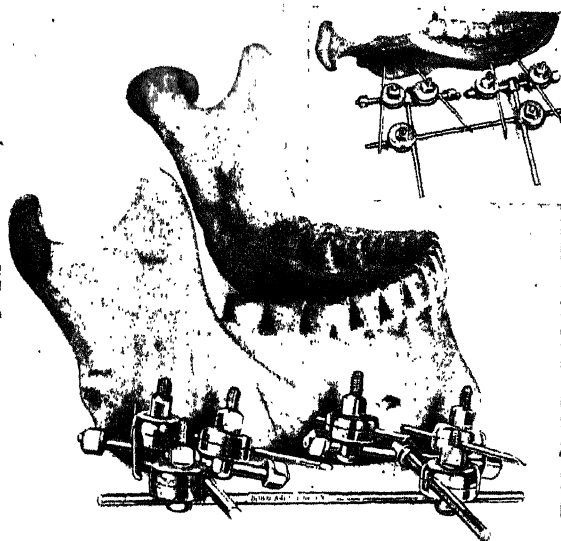
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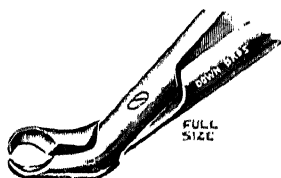
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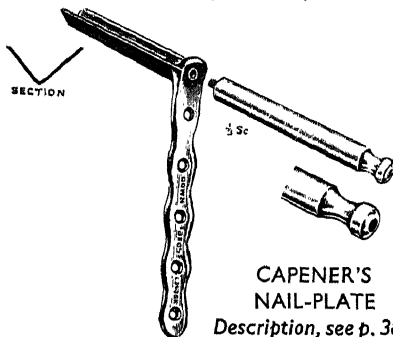
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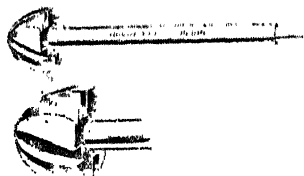
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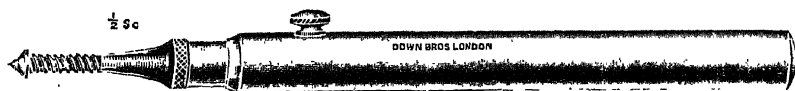
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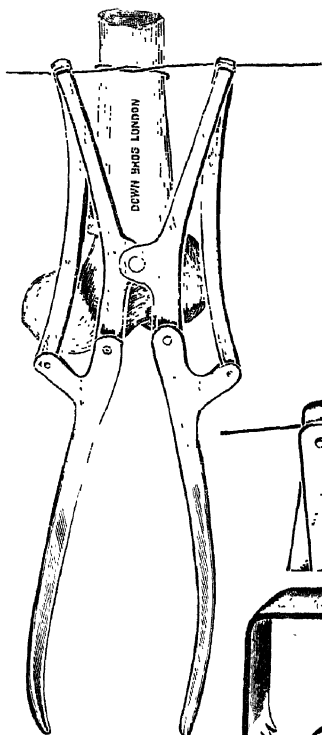
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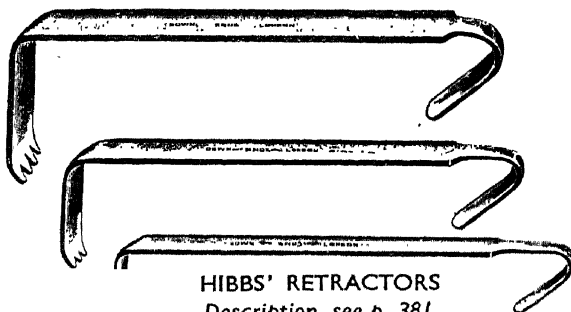
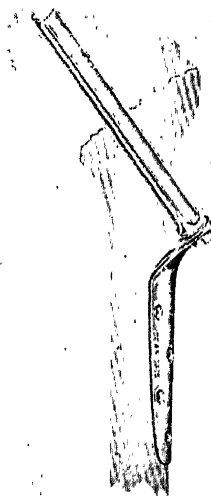


CAPENER'S PUNCH *Description, see p. 381*



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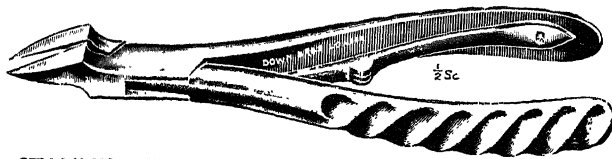
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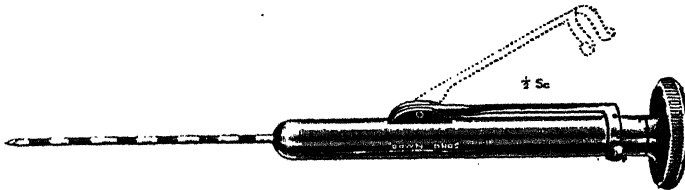
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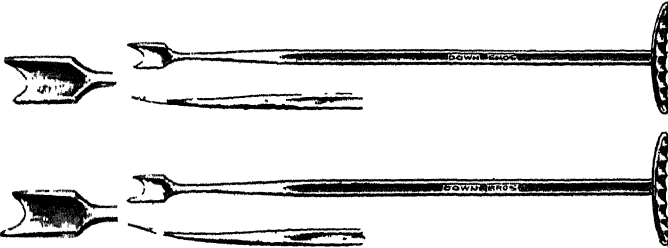
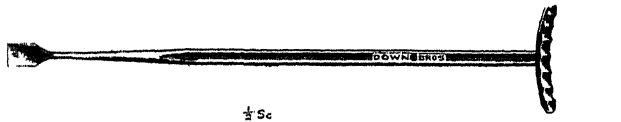
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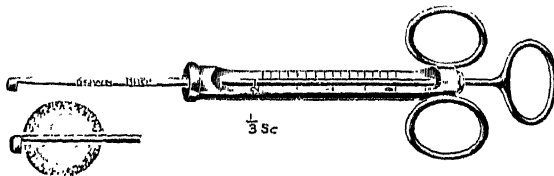
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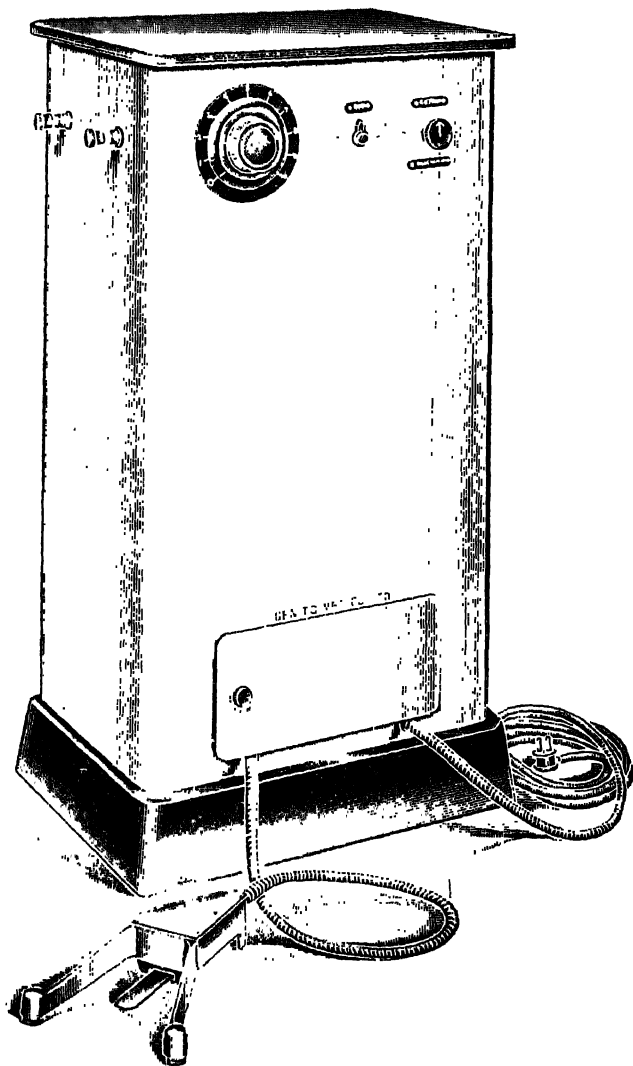
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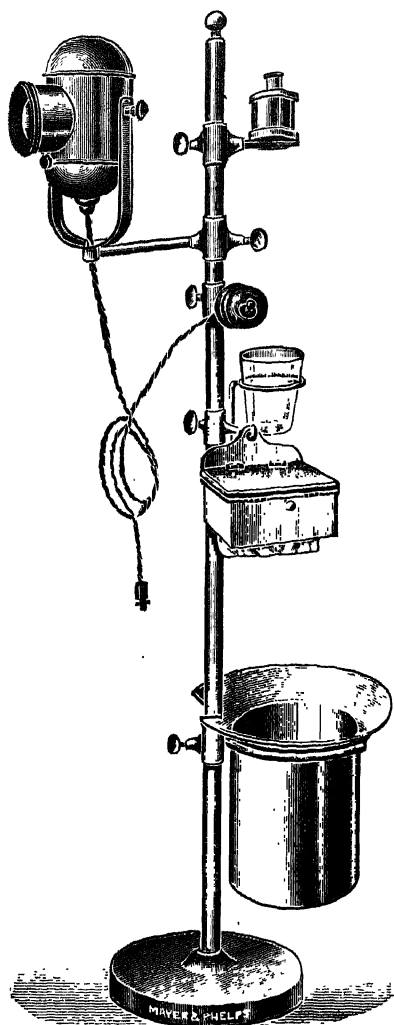
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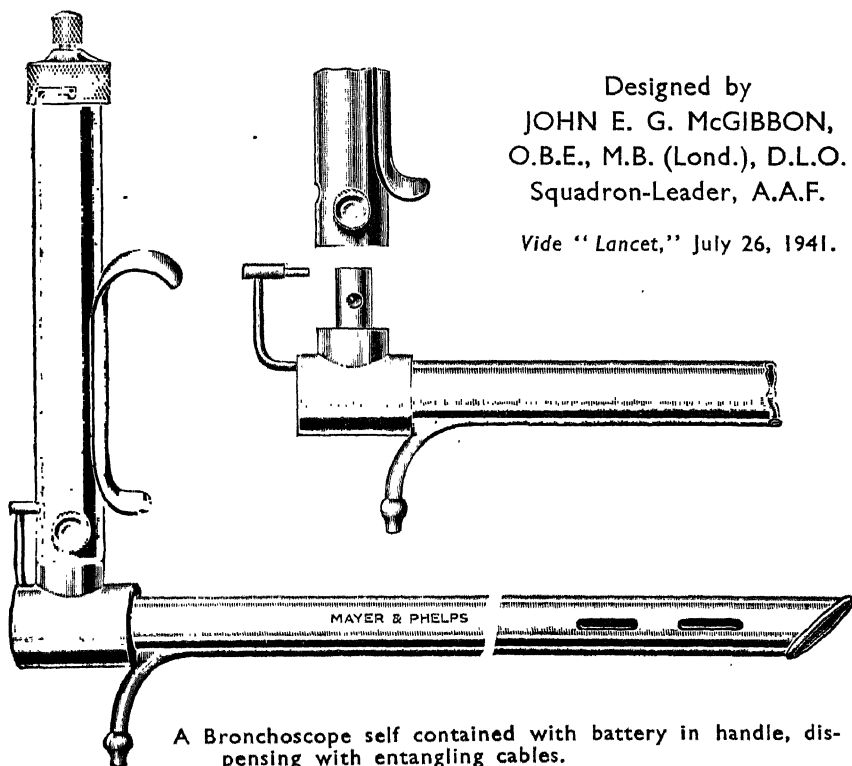
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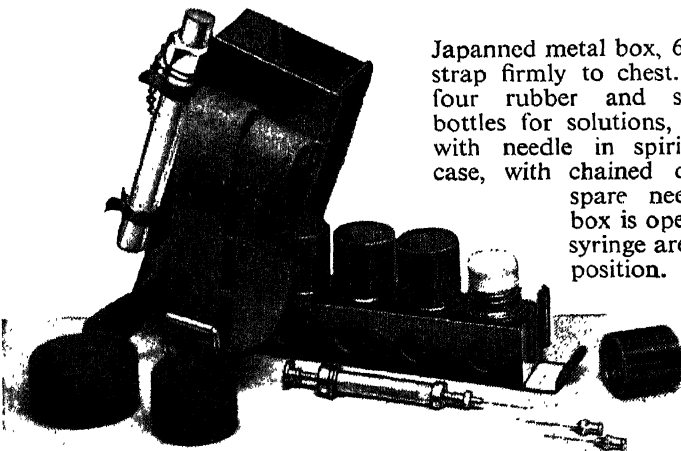
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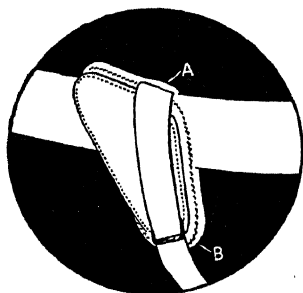
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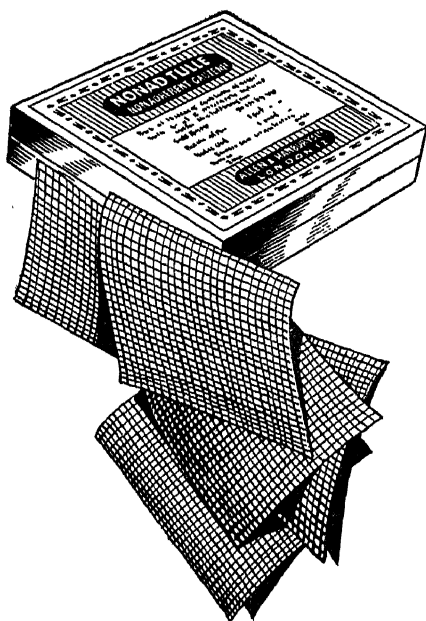
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